GESTRA®

Measuring, Open- and Closed-loop
Control System

SPECTOR*control* III

EN
English

Translation of the Original
Installation & Operating Manual

851127-01

Contents

Content of this Manual **5**
Scope of delivery/Product package **5**
How to use this Manual **6**
Illustrations and symbols used **6**
Hazard symbols in this Manual **6**
Types of warning **7**
Usage for the intended purpose **8**
IT security and rules for the use of Ethernet devices 8
Improper use **8**
Basic safety notes **9**
Required personnel qualifications **9**
Notes on product liability **9**
Function **10**
Technical data **11**
Name plate/identification **13**
Dimensions of the SPECTOR*control* III **14**
Required installation aperture in the control cabinet door or switch panel 14
Installing the SPECTOR*control* III **15**
Connecting the SPECTOR*control* III **17**
Interfaces and connections 17
Connecting the supply voltage X1 18
Connecting the RS232 interface X2 to the burner control: Modbus RTU 19
Connecting the CAN bus interface X3 20
CAN bus line, cable length and size 20
Ethernet connection X4, X5 22
USB ports X6, X7 23
WAGO I/O System 750 23
Factory default settings **24**
Operation and navigation **25**
User interface, screen layout 25
Operation 25
Signal properties 27
Names 27
Scaling and limit values 27
Alarm groups 28
Signal processing 28
Signal selection masks 28
Password protection for entering parameters 29

Contents

Entering names and parameters using the virtual keyboards 30
Signal selection *31*
Meaning of buttons and icons 32
The home screen 36
Configuring the screen view 36
Data log 37
Settings 38
Setting the date and time 38
I/O module 38
Network and connections 39
Services 40
CAN bus 41
Alarm 42
View 43
Saving, loading 44
Predictive maintenance 44
Password 44
System 45
Inputs/outputs 46
CAN bus inputs 46
Analogue input 47
Analogue output 47
Digital input 48
Digital output 48
Switches 48
Setpoint 48
Modbus inputs/outputs 49
Modbus TCP client analogue input 49
Modbus TCP client analogue output 49
Modbus TCP client digital input 50
Modbus TCP client digital output 50
Burner analogue signal 50
Burner digital signal 50
Controllers 51
Brief description of individual controller types 51
Continuous controllers and 3-position stepping controllers 51
2-position controller 53
Pump controller 53

Contents

3-element controller 54
Intermittent blowdown controller 54
Continuous stepping controller 55
Functions 56
Flow rate (Quantity) 56
Parameter 58
Steam calculator 58
Calculation 59
Logical function 60
Step chain 61
Timer 61
Maintenance 62
Burners 63
Alarms 65
Alarm history 65
First-up signal 65
Acknowledging alarms 65
Security updates 66
Updating the SPECTOR*control* *66*
Procedure 67
Checking the firmware version 67
USB update 68
Firmware update 68
SPECTOR*control* update 70
Cleaning and maintenance 72
System malfunctions 72
Indications, diagnosis and remedies 72
Diagnostics 73
What to do about high-frequency interference 73
Error codes in SPECTOR*connect* equipment 74
Taking out of service 77
Disposal 77
Note on open-source software 77
Declaration of Conformity; Standards and Directives 78

Content of this Manual

Product:

SPECTOR*control* III measuring, open- and closed-loop control system

© Copyright

All rights reserved. Any misuse, particularly reproduction and dissemination to third parties, is not permitted. The General Terms & Conditions of GESTRA apply.

Scope of delivery/Product package

- 1 x SPECTOR*control* III
- 1 x 3-pole connector (power supply)
- 1 x RS232 connector
- 1 x CAN bus connector
- 1 x cord seal (∅ 3 mm) (gasket)
- 1 x bezel incl. 6 nuts
- 1 x microSD card
- 1 x Installation & Operating Manual

How to use this Manual

This Installation & Operating Manual describes the correct use of the SPECTOR*control* III. It applies to all persons who integrate this equipment into control systems, install, bring into service, operate, maintain and dispose of this equipment. Anyone carrying out the above-mentioned activities must have read this Installation & Operating Manual and understood its contents. Following the instructions in the Installation & Operating Manual helps to avoid danger and increase the reliability and service life of the equipment.

In addition to the instructions in this Installation & Operating Manual, always follow the binding regulations for accident prevention applicable in the country and place of use, as well as the recognised technical regulations for safe and proper working.

- Read this Manual in full and follow all instructions given.
- Please also read the instructions for use of any accessories.
- Always keep this Installation & Operating Manual together with the system documentation.

Availability of this Installation & Operating Manual

- Make sure this Installation & Operating Manual is always available to the operator.
- The Installation & Operating Manual is part of the equipment package. If you pass on or sell the equipment to a third party, please also hand over this Installation & Operating Manual.

Illustrations and symbols used

1. Action to be taken
2.

- Lists
  - Bullet points in lists

Ⓐ Keys to illustrations

Additional information

Read the relevant Installation & Operating Manual

Hazard symbols in this Manual

Danger zone/Dangerous situation

Danger of death from electric shock

Types of warning

⚠ DANGER

Warning of a dangerous situation that will result in death or serious injury.

⚠ WARNING

Warning of a dangerous situation that may result in death or serious injury.

⚠ CAUTION

Warning of a situation that may result in minor or moderate injury.

⚠ ATTENTION

Warning of a situation that will result in damage to property or the environment.

Usage for the intended purpose

The SPECTOR*control* III is used for the open- and closed-loop control, display and parameter settings of GESTRA CANopen devices.

In addition, an I/O system specified by GESTRA can be used to connect any field devices with standard signals. All signals can be used for open- and closed-loop control.

- Safety functions must be implemented separately using GESTRA limiter systems.
- The SPECTOR*control* III is only suitable for use in contained indoor spaces.
- The SPECTOR*control* III is designed for frontal installation (e.g. in control cabinet doors or switch panels). It may only be used when correctly installed.

IT security and rules for the use of Ethernet devices

The plant operator is responsible for the security of its IT network and must take appropriate action to protect plants, systems and components against unauthorised access.

If you use Ethernet devices in your plant, please pay attention to the instructions below:

- Do not connect plants, systems or components to an open network, such as the internet, without safeguards in place.
- To fully protect a PLC runtime system on a control system that is available on the internet, the use of common security mechanisms (firewall, VPN access) is absolutely essential.
- Deploy defence in depth mechanisms in your system security, to restrict access and control to individual products and networks.
- Restrict access to all components to authorised persons only. The SPECTOR*control* III must be installed in a locked control cabinet in a locked room.
- Make sure you change the default passwords!
  - Use strong passwords (10 characters) and keep these under lock and key.
  - Change the set passwords regularly.
- If using a USB stick, use only verified/trustworthy USB hardware.
  - Before using a USB stick, it is essential to check that it is not infected with malware.

The Modbus protocol is not secure and lacks IT and cybersecurity mechanisms.
Therefore, if you intend to use this, check before doing so that this protocol is suitable.

Improper use

There is a danger of death due to explosion if the equipment is used in potentially explosive atmospheres.

Do not use the equipment in potentially explosive atmospheres.

Basic safety notes

There is a risk of electric shock during work on electrical systems.

- Always switch off the voltage to the equipment before performing work on the terminal strips.
- Check that the plant is not carrying live voltage before commencing work.

Required personnel qualifications

Activity	Personnel	
Integration in control system	Specialist staff	Plant designer
Network integration	Specialist staff	Specialist in network infrastructure and related security concepts
Installation/electrical connection/bringing into service	Specialist staff	Electrician/installer The equipment may only be installed, wired and brought into service by qualified and competent staff.
Operation	Boiler service technician	Staff trained by the plant operator
Maintenance work	Specialist staff	Electrician Maintenance and refits may only be performed by authorised staff who have undergone specific training.
Refits	Specialist staff	Plant construction

Fig. 1

Notes on product liability

The manufacturer cannot accept any liability for damage resulting from improper use of the equipment.

Function

The SPECTOR*control* III is an open-/closed-loop control, display and operating panel with integrated programmable logic controller (PLC). In addition to GESTRA SPECTOR*connect* equipment such as conductive and capacitive level electrodes, temperature limiters and conductivity electrodes, many third-party systems can also be connected and incorporated in the overall system.

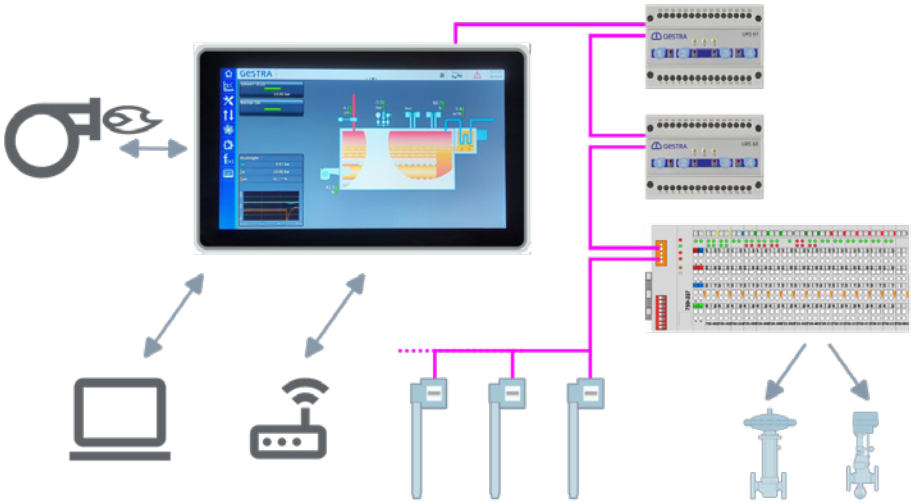


Fig. 2

CAN bus system functions

The SPECTOR*control* III periodically determines the current parameter settings and values of the CANopen devices. These are available for viewing as soon as the associated node ID has been set or configured. After this, you can change the settings of the connected devices.

The arrangement of individual inputs for the various CAN bus nodes is flexible. This is not the case for the I/O system, however, where the mechanical layout is fixed.

The system enables digital signals and analogue values to be processed, so that plant-specific switching and control tasks can be carried out. To do this, alarm and switching limits can be set and assigned to the controllers or further processed by logical and calculation functions.

Numerous options are available for the output and display of all signals.

All signals and values can be given unique names, allowing a clear overview of the plant.

The SPECTOR*control* III features control functions only – it does not perform any safety or limiter functions. These must be implemented separately. Only equipment approved by GESTRA may be used in the CAN bus.

Technical data

Supply voltage

- 24 VDC (⎓) +/- 20%

Power consumption

- Max. 29 W

Current input

- Max.1.2 A (at 24 VDC)

Data transmission interfaces

- 2 x Ethernet 100/1000 Mbps RJ45
  - Intranet
  - Modbus TCP client/server
  - OPC UA server (optional)
  - Various fieldbuses with gateways can be implemented
- CAN bus interface (galvanically isolated)
- Modbus RTU RS232 (galvanically isolated) for specific burner connection
- 1 x microSD card slot
  - One microSD card is included in the configuration
- 2 x USB ports (type A) for importing and exporting data

Indicators and controls

- 15.6“ PCAP colour touchscreen with dimmable backlight
- Resolution 1366 x 768 pixels (16:9)
- Brightness 350 Cd/m^2
- Display area 344 mm x 194 mm

Technical data

IP rating

- Front: IP 65
- Back: IP 20

Admissible ambient conditions

- Service temperature: 0 °C – 50 °C
- Storage temperature: - 20 °C – 70 °C
  - ◆ Air in the room must be clean and not salty or otherwise corrosive
- Transport temperature: - 20 °C – 70 °C
- Air humidity: 10 % – 85% relative humidity, non-condensing
- Max. altitude for operation: 2000 m above sea level

Body

- Front made of metal and scratch-resistant glass, back made of metal
- Intended for installation in a control cabinet or switch panel

Dimensions, see page 14

- Front panel (W x H) 404 mm x 251 mm
- Switch panel cutout (W x H) 387 mm x 234 mm
- Depth 43 mm

Weight

- Approx. 3 kg

I/O module (maximum expansion)

- 40 analogue inputs
- 20 analogue outputs
- 60 digital inputs
- 40 digital outputs

Name plate/identification

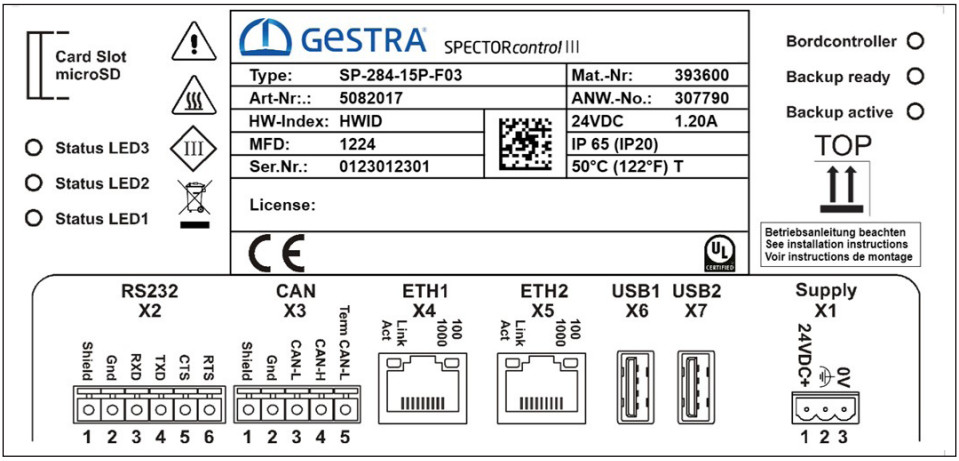


Fig. 3

Dimensions of the SPECTOR*control* III

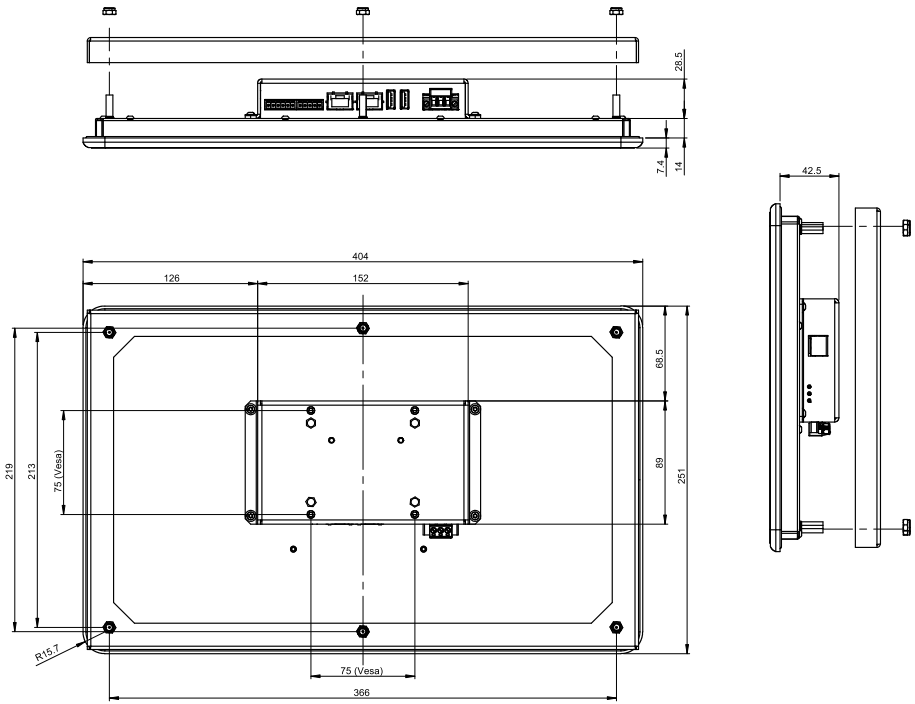


Fig. 4

Required installation aperture in the control cabinet door or switch panel

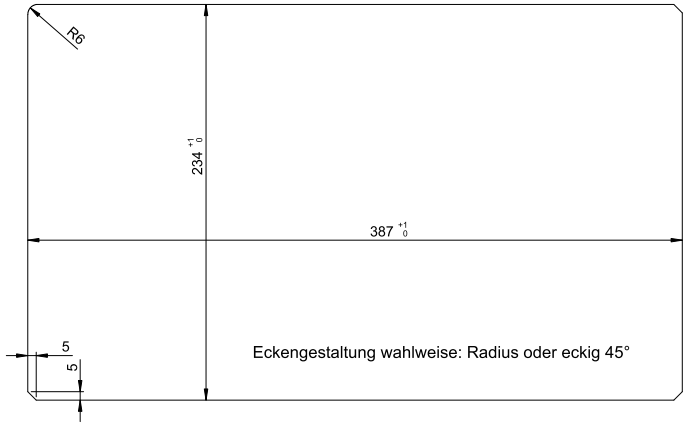


Fig. 5

Installing the SPECTOR*control* III

The SPECTOR*control* III is designed for frontal installation (e.g. in control cabinet doors or switch panels).

The control cabinet door or switch panel may have a maximum thickness of 5 mm.

To ensure safe operation, install the SPECTOR*control* III so that it is freely accessible at all times.

For installation, you will need the following tools:

- A tool for cutting the installation aperture
- Size 8 socket wrench

CAUTION

Risk of injury from sharp edges

There is a risk of cuts from sharp-edged parts of the equipment and the switch panel cutout.

- Wear protective gloves during installation.
- The plant operator is under obligation to ensure that the protective clothing specified for the relevant activity is worn during all work on the equipment.

ATTENTION

Direct sunlight or high ambient temperatures during operation can damage the SPECTOR*control* III.

- Avoid installation locations where direct sunlight falls onto the screen for long periods.
- Maintain the admissible ambient conditions for operating the SPECTOR*control* III, see page 12.

Pay attention to the applicable national health
and safety and accident prevention regulations at the site of installation.

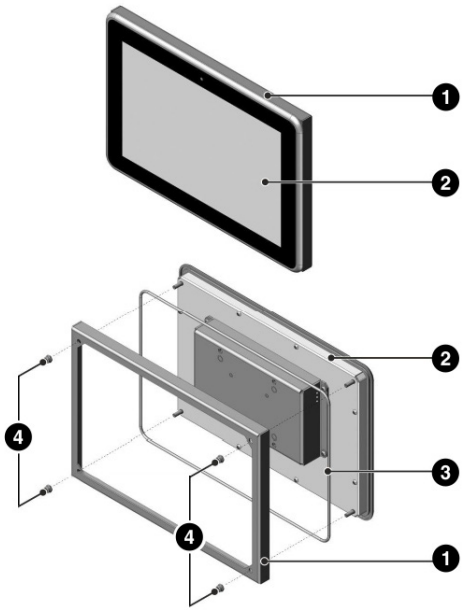


Fig. 6

❶ Bezel / ❷ Screen / ❸ Cord seal (∅ 3 mm) (gasket) / ❹ Lock nuts

Install the SPECTOR*control* III as follows:

1. Cut an aperture (see Fig. 5) in the control cabinet door or switch panel.
2. Unscrew the lock nuts ❹ from the threaded pins and completely detach the bezel ❶.
3. Lay the supplied cord seal ❸ (gasket) in the groove around the screen ❷.
4. Carefully slide the SPECTOR*control* III into the aperture from the front, taking care to insert the cord seal ❸ (gasket) fully in the groove.
5. Next, slide the bezel ❶ over the threaded pins from behind.
6. Firmly and evenly screw the unit and bezel ❶ together using the lock nuts ❹ (only until the screen ❷ is in contact with the front panel all the way round).

Avoid torques **in excess of 0.5 Nm** when tightening the lock nuts, as this could damage the equipment.

Make sure the gasket is seated correctly on the front panel. On units with a cord seal-type gasket, the two ends of the gasket must meet at the bottom of the unit without a gap.

Connecting the SPECTOR*control* III

Interfaces and connections

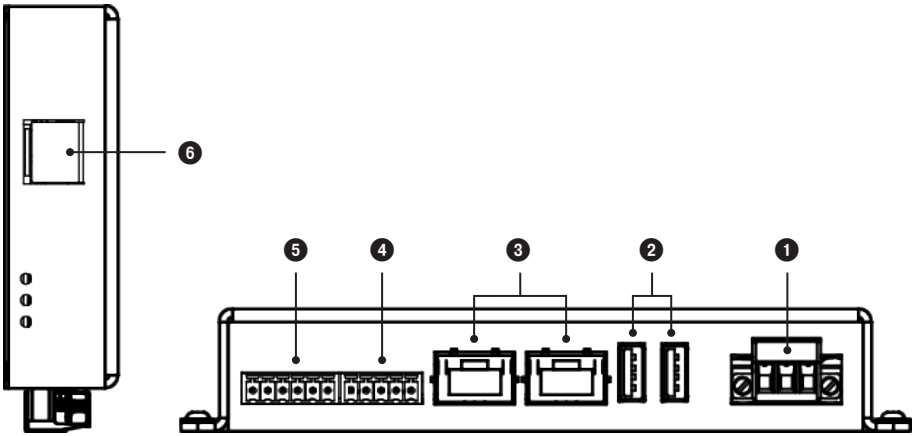


Fig. 7

Item	Code name	Description
1	X1	Power supply
2	X6, X7	2 x USB 2.0
3	X4, X5	2 x Ethernet (LAN)
4	X3	CAN bus interface
5	X2	RS232 (COM)
6	microSD card	microSD card slot

Please pay attention to the instructions of the connected devices.

Connecting the SPECTOR*control* III

Connecting the supply voltage X1

The SPECTOR*control* III is a Class III device and is supplied with 24 VDC Safety Extra Low Voltage (SELV).

- The power supply is not galvanically isolated.
- The 0 V connection is directly at the equipotential bonding of the housing (FE).
- A diode protects the power supply from reverse polarity. If polarity is reversed, operation is not possible.

⚠ WARNING

Connection to an unsuitable power supply carries a risk of injury!

If the SPECTOR*control* III is connected to a power supply that is not classified as SELV, this can result in an electric shock or fire.

- Therefore, use a SELV power supply unit for connecting the supply voltage.

To connect the supply voltage to the 3-pole connector, use a cable with a conductor size of 0.5 mm² – 2.5 mm².

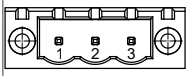
X1	Pin no.	Signal	Function
	1	+24 VDC	Power supply 24 VDC
	2	FE	Functional earth (equipotential bonding on housing, GND)
	3	0 V	Power supply 0 V (GND)

Fig. 8

Connecting the RS232 interface X2 to the burner control: Modbus RTU

⚠ WARNING

Risk of injury if signal transmission is disrupted!

Disruptions during signal transmission can cause the machine/plant to behave in unexpected ways. This can lead to injuries.

- Only use a shielded multi-core data cable for connection.
- Route the data cable to other devices separately from power lines.
- Connect the shield of the data cable just once to the central earthing point (CEP) in the control cabinet.

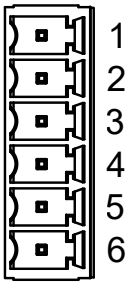
X2	Pin no.	Signal	Function
	1	Shield	Connection for the cable shield Directly on the housing/0 V potential
	2	GND	Reference for RS232 signals
	3	RXD	RS232 Signal Receive Data (input)
	4	TXD	RS232 Signal Transmit Data (output)
	5	CTS	Not in use
	6	RTS	Not in use

Fig. 9

Conductor size:
- without ferrule – 0.5 mm² – 1.5 mm²
- with ferrule – 0.25 mm² – 0.75 mm²

Connecting the SPECTOR*control* III

Connecting the CAN bus interface X3

⚠ WARNING

Risk of injury if signal transmission is disrupted!

Disruptions during signal transmission can cause the machine/plant to behave in unexpected ways. This can lead to injuries.

- Only use a shielded multi-core CAN bus (DeviceNet) cable for connection.

⚠ ATTENTION

The installation of the data cable has a considerable impact on the electromagnetic compatibility (EMC) of the SPECTOR*control* III. Therefore, take special care during connection.

- Make sure wiring is in line, not in a star!
- Route the data cable to other devices separately from power lines.
- Connect the bus line shields to one another all the way along, and connect to the central earthing point (CEP).
- Install a 120 Ω terminating resistor on the first and last device (CAN LOW/CAN HIGH terminal).

CAN bus line, cable length and size

- Use a shielded, multi-core, twisted pair CAN bus (DeviceNet) cable as the bus line.
- Pre-wired control cables (with connector and coupling) are available as accessories in various lengths.
- The baud rate (transfer rate) is determined by the cable length between the bus terminal devices, and the conductor size is determined by the overall current input of the measuring sensors.
- 0.2 A at 24 V is required per sensor. With five sensors, there is therefore a voltage drop of approx. 8 V per 100 m when using cables of 0.5 mm². In this case, the system is operating at its limits.
- If using five or more sensors and a cable length of ≥ 100 m, the conductor size needs to be doubled to 1.0 mm².
- At larger distances of > 100 m, the 24 VDC supply can also be provided on site.

Connecting the SPECTOR*control* III

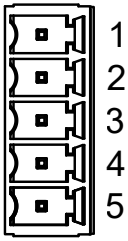
X3	Pin no.	Signal	Function
	1	Shield	Connection for the cable shield Directly on the housing/0 V potential
	2	GND	Reference for CAN signals
	3	CAN-L	CAN signal L (pull low)
	4	CAN-H	CAN signal H (pull high)
	5	Term CAN-L	Termination, signal CAN-L

Fig. 10

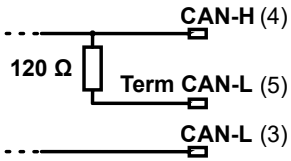
Integrated termination (terminating resistor) for the CAN bus	
	If the equipment is operated at one end of the bus, the bus terminating resistor (120 Ω) can be connected via Term CAN-L. For termination, you must additionally install a short bridge between CAN-L and Term CAN-L.

Fig. 11

Conductor size:
- without ferrule – 0.5 mm² – 1.5 mm²
- with ferrule – 0.25 mm² – 0.75 mm²

Connecting the SPECTOR*control* III

Ethernet connection X4, X5

The Ethernet interface conforms to standard IEEE 802.3 (10/100/1000BASE-T).

- The network connection is produced using a shielded Cat-5e cable with RJ45 connectors.
- The maximum cable length and link speed are determined by the cable properties defined in EIA/TIA 568 TSB-36. Cable lengths up to 100 m are permitted.

⚠ WARNING

Risk of injury if signal transmission is disrupted!

Disruptions during signal transmission can cause the machine/plant to behave in unexpected ways. This can lead to injuries.

- Route the data cable to other devices separately from power lines.
- Connect the shield of the data cable just once to the central earthing point (CEP) in the control cabinet.

X4	Signal		Function
1..8	Orange	On	Link speed 100 Mb or 1000 Mb
		Off	Link speed 10 Mb
	Green	Off	No link
		On	Link to switch or another device
		Flashes	Active, Sending or Receiving

Fig. 12

Connecting the SPECTOR*control* III

USB ports X6, X7

The two USB ports conform to the Type A USB Host 2.0 standard. They are needed for backups and updates.

⚠ ATTENTION

Compromised components jeopardise safe operation of the plant.

- If using a USB stick, use only verified/trustworthy USB hardware.
- Before using a USB stick, it is essential to check that it is not infected with malware.

WAGO I/O System 750

The WAGO I/O System 750 is used for recording standard signals.
The following components have been approved by GESTRA:

- Bus coupler: 750-337, 750-338
- Analogue inputs: 750-452, 750-453, 750-454, 750-455, 750-459, 750-461, 750-466, 750-467
- Analogue outputs: 750-550, 750-552, 750-553, 750-554, 750-555, 750-559
- Digital inputs: 750-400, 750-402, 750-430, 750-14xx*
- Digital outputs: 750-513, 750-504, 750-530, 750-15xx*
- Power supply modules: 750-602, 750-613
- Bus end terminal: 750-600

** With one data bit per input/output*

Please check your configuration using the WAGO Configurator at https://configurator.wago.com/

WAGO is a registered trademark of WAGO Verwaltungsgesellschaft mbH.

Factory default settings

The inputs/outputs of the WAGO I/O terminal are determined when power is switched on and enabled in the input mask view.

The application data is saved on the microSD card (FAT32).

■ Date/time	Current date and time
■ Language	German
■ IP address 1 (ETH1, X4)	192.168.0.99
■ IP address 2 (ETH2, X5)	DHCP active
■ Password level 1:	aaa
■ Password level 2:	bbb
■ Password level 3:	GESTRA
■ Node ID SC	127
■ Node ID of WAGO I/O	126
■ Baud rate	50 kB
■ SPECTOR*control* III runtime licence	Already set, licence is on the back

Unauthorised access poses a risk of material damages in the compromised plant.

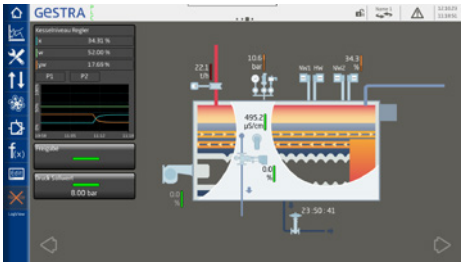
You must change the default passwords before bringing into service for the first time!

- Use strong passwords (max. 10 characters) and keep these under lock and key.
- Use different passwords.
- It is essential to change set passwords regularly.

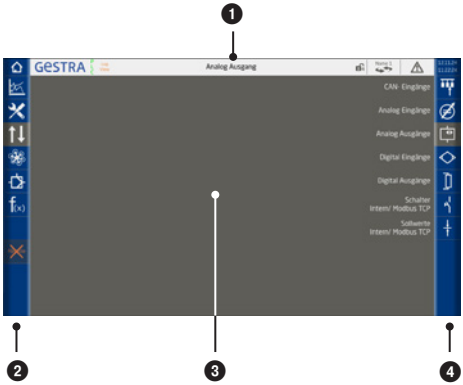
Operation and navigation

When you switch on the supply voltage for the SPECTOR*control* III, a home screen opens. You can swipe to view different pages.

The SPECTOR*control* III is operated either on the equipment itself using the colour touchscreen or via Ethernet using VNC.



User interface, screen layout



Item	Description
❶	The **title bar** shows the selected menu and the time and date.
❷	The **menu bar** shows all the available menus.
❸	The **display area** changes depending on which menu is open.
❹	The **toolbar** shows the features available, depending on which menu is open.

Operation

Operate the SPECTOR*control* III by touching the on-screen buttons and by swiping. Tap the buttons and input fields to initiate all inputs and actions, e.g. to open the Setup menus.

When you tap a button in the toolbar, this is then shown with a grey background.

Configuration

Only configure the SPECTOR*control* III directly on the equipment.

Operation and navigation

All input fields and list boxes and buttons have a colour background.

White input fields behave like buttons. Light grey fields show readings/signals, light green show additional status information. Orange and red text is up-to-date status information.

Background colour	Description/Function
White	Input field/List box/On/Off
Light grey	Shows readings and states
Grey	Descriptions

The colour of the text reflects the current status, for example:

HiHi	80.00 %	3 s	Alarmeintrag Ein
Hi	60.00 %	0 s	
Lo	40.00 %	0 s	
LoLo	20.00 %	3 s	Alarmeintrag Aus

Text colour	Description/Function
Black	Function is disabled
Green	Function is enabled, signal > 0, status OK
Orange	Values above or below limits
Red	Error/alarm state, values above or below alarm limits

Operation and navigation

Signal properties

All signals in the system have properties in common, which are described here.

Names

Unique names can be assigned to all signals. This enables a clear overview of the plant.

You can assign two names and switch between them. This enables you to switch easily between languages or switch from a plain text name to a plant designation.

Name 1	Druckregler
Name 2	Pressure control

Maximum number of characters = 30

Scaling and limit values

Analogue signals always have a measuring range and up to four limit values can be defined.

With analogue inputs, the measuring range is used to scale the signal (4-20 mA, 0-10 V). Otherwise, it is used solely for display purposes in the system.

The limit values must always lie inside the measuring range and ascend from LoLo to HiHi. The delay is an On and Off delay. The signals generated in this way can be further processed in the system.

Bereich/Grenzen/Alarm-/Verzögerung

Bereich 100%	10.00 bar		
HiHi	8.00 bar	3 s	Alarmeintrag Ein
Hi	6.00 bar	0 s	
Lo	0.00 bar	0 s	
LoLo	0.00 bar	3 s	Alarmeintrag Aus
Bereich 0%	0.00 bar		

When the alarm input is enabled, events are entered in the alarm list.

Digital signals can also generate alarms. For this to happen, the function must be enabled.

You can then configure how the system behaves.

Alarmeintrag	Ein
Alarm bei	Ausgangssignal Aus
Alarm-Verzögerungszeit	0 s
Alarm Signal	Aus

Operation and navigation

Alarm groups

Alarms can be grouped, enabling alarm signals to be generated for plant parts, for example.

If at least one alarm entry is active, alarm groups can be configured.

Signal processing

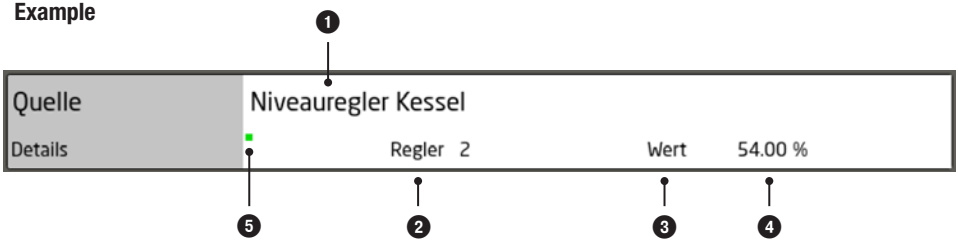
Signal processing can be disabled. Then, the status no longer changes.

If the signal is no longer needed, it can be deleted. This deletes all parameters and allows you to create a new signal.

Signal selection masks

Selection masks are available in various views, but they are all comparable.

Example



Item	Description
1	List box, shows the name of the signal.
2	Shows what the selected signal represents.
3	Signal type of the selected signal
4	Current value with unit
5	Signal processing of source “On” (green dot)

Password protection for entering parameters

The entry and selection of parameters is password-protected by default. The password prompt appears automatically when you tap an input field.

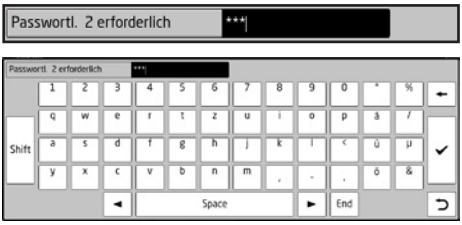
If you do not enter anything for 60 seconds, you will be logged off again.

Passwords, default passwords

- Password level 1 = aaa
- Password level 2= bbb
- Password level 3 = GESTRA

Recommendation when installing for the first time

Log in with the default password and change it when configuration is complete.



Apply the password.

Discard entries and exit the keyboard.

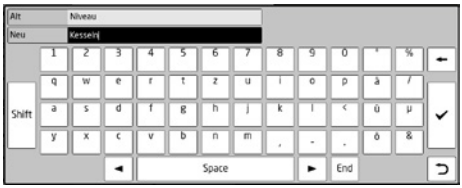
Maximum length of password:

10 characters

Entering names and parameters using the virtual keyboards

Tapping an input field opens a virtual alphanumeric or numeric keyboard.

You can also use the PC keyboard if you are connected to the equipment remotely.



- Tap the “Shift” key to access special characters.
- Tapping “Shift” twice turns capitalisation on.

As well as the old value (“Old”), the numeric keypad also shows the limits (“Min”/“Max”).

Your entry must be within these limits.

Applies to both keyboards

The entry is accepted.

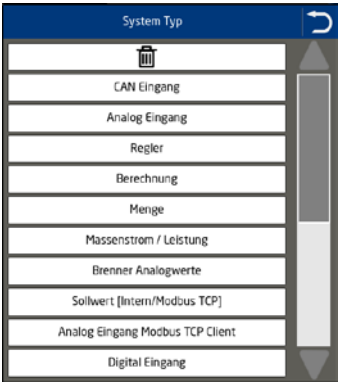
Discard entries and exit the keyboard.

Signal selection

The signal list box opens, where you can assign signals in the SPECTOR*control* III.

Here, the signals available for selection are sorted by type.

You can scroll up and down through long lists and menus using scroll bars to navigate to the parameters you require.



Operation and navigation

Meaning of buttons and icons

Icon	Description	
	Home screen – opens home screen 1 to 4 The display skips to the page defined in “Setup Display”.	
	Data log	
	Settings	
		Date, time – time zone, NTP
		I/O module Configuration/number of WAGO terminals, overview of connected terminals
		Network, connections IP addresses, Modbus and OPC configuration, burner connection, etc.
		CAN bus – baud rate setting Read out the list of nodes and the error memory.
		Alarm, alarm groups Configure alarm signals and alarm groups
		View Languages, home screen configuration, display settings
		Save, load Save, restore, import and export configurations.
		Predictive maintenance View and configure information and limits of electrodes and control units.
		Password Password configuration, login credentials, request temporary password.
		System PCS info, software info, SPECTOR*control* update, firmware update

Operation and navigation

Icon	Description	
		Inputs/outputs
		CAN bus inputs
		Analogue inputs
		Analogue outputs
		Digital inputs
		Digital outputs
		Switches/Internal/Modbus TCP
		Setpoints/Internal/Modbus TCP
		Modbus TCP client and burner signals
		Analogue inputs/Modbus TCP client
		Digital inputs/Modbus TCP client
		Analogue outputs/Modbus TCP client
		Digital outputs/Modbus TCP client
		Burner analogue signals (Only visible if a burner coupling is active.)
		Burner digital signals (Only visible if a burner coupling is active.)

Operation and navigation

Icon	Description	
	Controller	
f(x)	Functions	
		Flow rate
		Steam calculator (mass flow/power)
		Calculation
		Logical function
		Step chain
		Timer
		Maintenance
Edit	Home screens Edit mode Only shown on the home screens if the current password level is 2 or 3. Same function as “Swipe up” on the home screens.	
Remote	Terminate remote connection	
	Burner 1..2 – Open burner parameters/configuration	
2	Password level 1..3 – The current password level is shown.	
Name 1	Name switch You can switch between Name 1 and Name 2.	

Operation and navigation

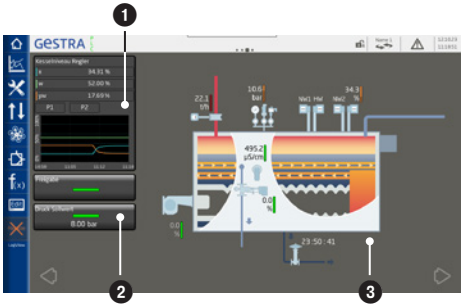
Icon	Description	
	Alarm – Open alarm page Red flashing = Active alarm Red static = Active but acknowledged	
	History	Alarm history Shows historic alarms.
	First	First-up signal
		Alarm diagnostics When you highlight an alarm, the display skips to the relevant signal.
		Acknowledging alarms
	Go back, exit screen/entry	
	Clear/delete signals and content	
	Confirm – Apply value	

The home screen

Open the home screen.

After system configuration, the home screen opens and provides an up-to-date overall view. Other menus can also be opened directly from the home screen.

You can edit and adjust the view and content of the home screen at any time as needed.

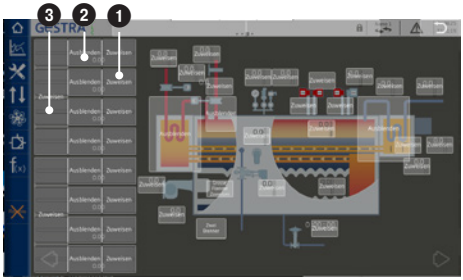


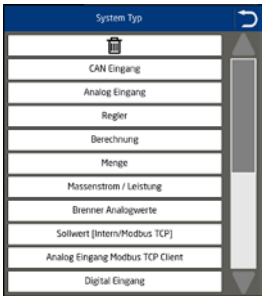
Item	Description
1	With the **large tile**, you can view controllers, flow rates and steam calculators.
2	With the **small tile**, you can view values, signals, setpoints and switches from the system.
3	You can change the **boiler image** via **Settings -> View**.

Configuring the screen view

Edit

Open home screen configuration.





Item	Description
1	Tap the “Assign” button to open the signal list, where you can select all signals from the system.
2	Tap the “Show” and “Hide” buttons to show or hide the tiles.
3	Tap the “Assign” button to select the “Controller”, “Flow rate” or “Steam calculator” signals. This view provides more details.

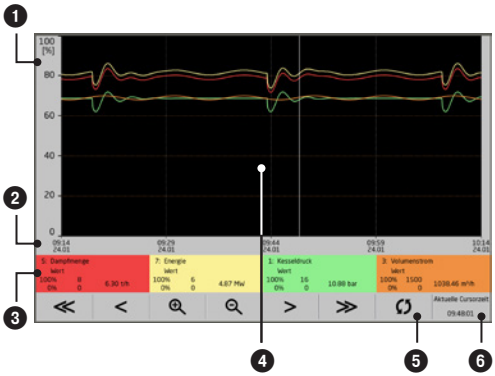
Data log

Open the data log page.

Data logs are used for recording and displaying readings. Recordings cover a period of 14 days with a 5-second interval. Data logs can be saved for external analysis and exported using the backup function.

Up to 30 signals can be assigned to a data log using the “Parameters” function. When you make your selection, the current range limits are applied and can be changed. This does not affect the original signal.

The trend windows provide a dynamic view of the signals. You can select signals from this data log via “Select curves”.



Item	Description
❶	Normalised display of the signal between range limits 0 – 100%
❷	Time and date
❸	Information about the signal: name, type, range limits, value
❹	Tapping the trend window enables the ruler and the corresponding values are shown in ❸. The time on the ruler position is shown in ❻.
❺	Return to the current view
❻	Time at the ruler position

You can also move and zoom in and out of trend windows with your fingers.

Setting the date and time

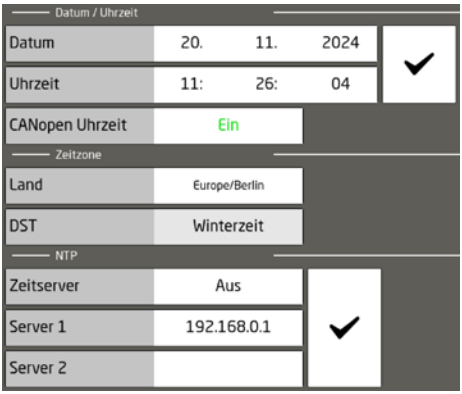
>

The unit automatically switches between summer and winter time. To do this, you must have set the correct time zone.

The time can be read from an NTP server to obtain a synchronised time.

If NTP is not enabled, you can set the date and time manually.

You can enter the time via the CAN bus, to ensure the SPECTOR*connect* devices receive a valid time.



I/O module

> IO

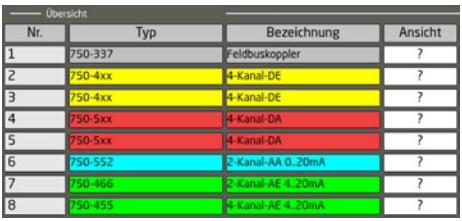
The I/O module is used for connecting standard signals of various types (WAGO I/O System 750, see page 23).

To enable the signals to be configured, enter the number of inputs and outputs the I/O module has.

The defined structure of the I/O module is shown in the overview.

Tapping the question mark "**?**" opens the relevant connection diagram.

Please pay attention to the instructions of the modules used.



Settings

Network and connections

Network

The SPECTOR*control* III has two network interfaces.

You can obtain the addresses automatically via DHCP (DHCP “On”). Otherwise, you can assign them manually.

Netzwerk

	ETH1 X4	ETH2 X5
IP-Adresse Target	0.0.0.0	192.168.0.62
Subnetmaske	0.0.0.0	255.255.255.0
IP-Adresse Gateway	192.168.0.1	192.168.0.1
DNS	192.168.0.1	192.168.0.1
DHCP	Aus	Aus
MAC Adresse	F8: DC: 7A: 8F: F1: C2	8C: 1F: 64: 11: 7A: 0A
IP-Adresse	ermitteln	ermitteln

Modbus TCP server

The SPECTOR*control* III has Modbus TCP server functionality. This enables it to easily communicate and exchange data with other systems.

Two data models are supported:

- In Simplified mode, it behaves like a SPECTOR*control* II and less data is transferred. This mode is therefore suitable for data exchange or communication with less sophisticated equipment. You can select which signals to transfer and the position. The flow rate values are assigned to fixed registers.
- Advanced mode is more extensive and the data is available in different formats. This makes visualisation easier but places higher demands on the client. As well as “Flow rates”, there are also fixed assignments with additional data for “Controllers”, “Steam calculators”, “Maintenance” and “Burners”.

You can download the list of datapoints from our homepage:
www.gestra.com

Modbus TCP client

The SPECTOR*control* III can operate as a Modbus TCP client and read and write data from up to two Modbus servers.

This enables several SPECTOR*control* units to be combined, for example, or data from other control systems to be integrated.

For easier handling, you can assign a name to the client. For other parameters, refer to the description of the server.

	Client 1	Client 2
Name	Verarbeitung	
Modbus TCP	Ein	Aus
Port	502	502
Slave-ID	1	1
Slave IP- Adresse	192. 168. 0. 61	192. 168. 0. 90
Basisadresse	0	0
Alarm-Verzögerungszeit	10 s	10 s
Kommunikation	OK	

Modbus RTU gateway

The Spirax Sarco VLM30 and SLM30 steam flow rate calculators can be connected directly to the SPECTORcontrol via Modbus RTU. An external gateway is required for this. Set the necessary “Port” and “IP address” communication parameters here.

Settings

OPC UA server

The SPECTOR*control* has an OPC UA server function that requires a licence.

The function is available for 2 hours following a reboot, and can be used to its full extent during that time. The datapoint list shows the mapped elements in four categories along with their name and actual value, for easy verification. You can find a detailed description of the OPC UA datapoint list on our homepage in a file named BAN 809267-00 SC III OPC UA.pdf

Burners

Various burner controls from Siemens (Landis & Stefa) and Lamtec can be connected. This is done via Modbus RTU or Modbus TCP.

Please always pay attention to the instructions of the connected devices.

Siemens

Burner controls LMV5 and LMV2/3 can be connected and operated.

They are coupled via RS232 for the first burner and a Modbus RTU/TCP gateway for the second burner.

Gateways or converters may be required.

Modbus RTU parameters of the AZL:
Baud rate: 19200 kbit/s, address: 1

RS232 connection:

AZL COM2 (X72)	SPECTOR*control* (X2)
1 (TxD)	3 (RxD)
3 (RxD)	4 (TxD)
4 (GND)	2 (GND)

Lamtec

CMS and BT300 burner controls can be connected and operated via Modbus TCP, as well as FMS CMS and ETAMATIC (OEM) via Modbus RTU.

Modbus TCP enables two burner controls to be connected.

The 663R0403EF/RS232 must be used as the Modbus RTU gateway.

Modbus RTU parameters:
Baud rate: 9600/19200 kbit/s, address: 2

Services

FTPS:
The FTPs protocol enables data to be transferred securely between the SPECTOR*control* and a PC. This enables configuration or log data, for example, to be downloaded from the SPECTOR*control*. To use the service, assign an individual password and enable the service. The password must have a minimum of 6 characters. The FTPs server is accessed via “Port 21”.

VNC:

Settings

VNC allows you to share your screen over the network and enables remote control. To do this, turn on the service and assign a password. The VNC server is accessed via “Port 5900”. The RealVNC® Viewer and TigerVNC Viewer have been tested.

Firmware update:
There are several ways of performing a firmware update. As well as the USB function (under “System”), there is the Remote service, which can be enabled here. Once the service is enabled, the update can be installed via a web browser. The update page can be accessed via the SPECTORcontrol unit’s IP address and “Port 8080”. For example “http://192.168.0.99:8080”. After the file has been uploaded, the update begins and the process is completed after a reboot.

Once activated, the update page remains active for only 10 minutes or until the next reboot.

CAN bus

> CAN

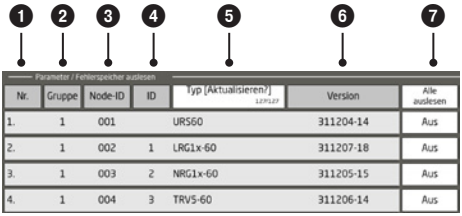
On this page, you can set the baud rate and find out the current status of the interface.

This page also contains a list of all known nodes in the CAN bus.

Reading out the error memory

1. Highlight the relevant CAN bus nodes.
2. Then start the readout.

Readout takes approx. 10 minutes per CAN bus node. You can continue using the SPECTOR*control* III in the meantime.



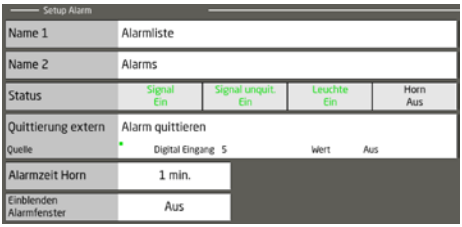
Item	Description
1	Consecutive number
2	SPECTOR*connect* group
3	Node ID Must be noted during assignment.
4	SPECTOR*connect* limiter ID
5	Type of connected CAN bus node
6	Software version
7	Enable “Read out fault memory” If this is supported by the connected CAN bus nodes.

Settings

Alarm

> 1,2,..,8

Different status signals are generated to show the status of the alarm list in the system.



Status signals

Status signal	Description
Signal	Always active when an entry in the alarm list is active.
Signal unacknowl-edged	Active if an entry in the alarm list has not yet been acknowledged. Triggered again with each new alarm.
Light	Behaves in the same way as the warning triangle. Off if there is no alarm on the list. Flashes for unacknowledged alarms and lights up continuously for acknowl-edged alarms.
Buzzer (horn)	Behaves in the same way as “**Signal unacknowledged**”. Becomes inactive again after the buzzer alarm time.

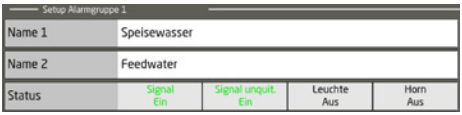
Acknowledging alarms

As well as using the button on the alarm page, alarms can also be acknowledged via an external signal. A digital input, for example, can be linked for this purpose.

Alarm groups

Alarm groups enable collective faults to be generated for individual plant parts.

The same status signals are generated as for the alarm list, but only for the assigned signals, however.



Assignment to alarm groups must always take place at the signal side – at the analogue input, for example.

Settings

View

> This page contains settings that affect the display.

Language
The language switching feature changes all static texts to the selected language. Any names entered remain unchanged.

Standard display
You can define which name (Name 1 or Name 2) is to be displayed after a reboot.

All names
All the names available in the system are displayed. “Name 1” and “Name 2” are shown in a table, which can be edited.

Colour of navigation bar
You can change the colour of the navigation bar as you wish by entering RGB values so that the bar suits your preferences. Take care to ensure there is sufficient contrast with icons.

Home screens
The view of the home screens can be individually adapted to suit the customer’s needs. As well as the screen that appears on start-up, various predefined images of steam and hot water boilers are also available for selection. If no suitable image is available, you can import your own images. To do this, the images must be stored in the SC/Data/ folder on a USB stick, and have the correct file name.

When a view has been changed, you need to confirm this change using the OK button at the end of the row.

Properties	
Size	1286 x 718 pixels
Background colour	Transparent or R:94, G:93, B:87
Image file page 3	OwnSP3.png
Image file page 4	OwnSP4.png

The files must be in the root folder of a FAT32-formatted USB stick.

Further settings
The backlight can be set for normal operation and screensaver mode. The screensaver comes on after 10 minutes of inactivity and protects the backlight. If the VNC timeout is enabled, the VNC connection ends when there is no activity for 10 minutes.

Cleaning
Use this page to clean the screen without risk of damage.
When you open this page, a 30-second countdown begins. After this, you can exit the page or start the countdown again.

No entries can be made during this time.

Settings

Saving, loading

Here you can save and reload settings that have been entered. This enables you to transfer settings to other plants or restore them in the event of problems.

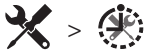
Three buffers are available, so that different states can also be saved and restored if necessary.

You can export and import these configurations using a USB stick.

⚠ ATTENTION

Bring the plant into a safe state before loading a configuration!

Predictive maintenance



This menu enables you to view limiter- and electrode-specific maintenance parameters.

The operating time, electrode tip temperature, internal alarm/error counters and alarm limits are set out in tables. You can define limits here.

If a limit is exceeded, an entry is made in the alarm table. The CAN bus signal quality is also presented in a trend graph.

Password

On this page, you can change passwords. You can change the passwords of the active password level and the level below it.

Requesting a password

If a higher password level is required for support, you can request a temporary password from GESTRA. This will have the necessary password level and will be valid for 30 minutes.

Settings

System

>

On this page, you can view and update the software and firmware versions. Please state these versions when requesting support. You can also initiate a warm reset, cold reset and reboot of the equipment. Information on run time and operation is also displayed.

Updates

Updates are available on the GESTRA homepage.

Always create a backup before any update!

Inputs/outputs

The inputs and outputs are the interface to the signals that are to be processed in the plant.

This is where you can set the parameters of the CAN inputs, the signals of the I/O terminal, the switches and setpoint functions.

CAN bus inputs

>

All GESTRA SPECTOR*connect* devices can be incorporated for exchanging signals.

- When you first enter the parameters of an input, a list box opens.
- Select the type of CAN node here.
- The relevant parameter page then appears.
- To assign the node ID, select the node from the “CAN bus info” list in the “Assign” input field. The node ID is applied automatically.
- You can also assign the node ID manually, to enable preconfiguration for nodes that are not connected.

The device is compatible with equipment from the SPECTOR*bus* series.

Safety control units

URS 60/URS 61 safety control units automatically identify the associated electrodes and display their status. Alarm processing is always active.

Limiter electrodes

In order to monitor the status of limiter electrodes and view them on the home screens, they must be individually assigned to a CAN input.

Level electrode

If the installation location is an external level pot, you can assign a monitoring unit (SRL 6-60) to monitor the flushing intervals. This freezes the level signal for the duration of the flushing process.

Conductivity electrode

Here, you can switch between µS/cm and ppm. The displayed parameters are calibrated on the electrode.

If the measured temperature of the fluid in the system is used, the signal can also be configured as an additional CAN input.

Inputs/outputs

Analogue input

> ≠

Different input modules can be used for standard signals.

- If you have not yet assigned a module type to an input, a list box appears.
- Select the type here.

Click the **i button** in the list box to see an overview of currently connected terminals.

- Set the measuring range from 0–100% as appropriate for the connected sensor.
- The current/voltage measurement signal can be calibrated. This is only required for special applications.

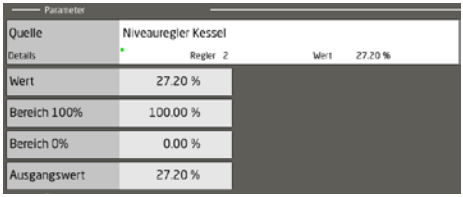
An analogue input hardware error is only generated if an alarm has been enabled for **HiHi** or **LoLo**.

Analogue output

>

You can assign a source directly to the analogue output.

The output value is normalised to 0–100% within the limits of the input signal.



Inputs/outputs

Digital input

The original input signal is shown. This signal can be inverted.

You can assign the resulting output signal to a first-up signal (First value message).

When alarm entry is “**On**”, the alarm signal is switched on.

This signal is dependent on the output signal and can be inverted via “**Alarm on” = “Output signal On/Off**”.

Parameter								
Eingangssignal	Ein							
Invertieren	Aus							
Ausgangssignal	Ein							
Erstwertmeldung	Aus							
Alarmeintrag	Ein							
Alarm bei	Ausgangssignal Aus							
Alarm-Verzögerungszeit	0 s							
Alarm Signal	Aus							
Alarmgruppe[n]	1	2	3	4	5	6	7	8

Digital output

You can assign a source to the digital output. The signal may be binary or analogue.

In the case of an analogue signal, the output signal switches at ≥ 1. The output can be inverted.

Switches

“Switches” allows you to execute switch and button functions. They can be used both internally on the home screen and externally via Modbus TCP.

- If you define a function as a button, you can enter a switching time.
- If the reset signal is assigned and has the value “1”, the switch is reset to “0”.
- If writing is also to take place externally via Modbus TCP, set the “Signal active” switch to **Local/Remote**. Similarly, you can also set what happens in the event of errors.

Setpoint

Use the setpoint to enter analogue values in the system. You can do this both internally and for external communication via Modbus TCP.

This enables setpoints to be specified for controllers or burners, for example. These signals can also be viewed on the home screens and written directly from there.

- The setpoint is configured with the unit and the range limits.
- If you wish writing to take place externally via Modbus TCP, you must set the “Value active” switch to
  Local/Remote. Similarly, you can also set what happens in the event of errors.

Modbus inputs/outputs

With the Modbus TCP client functionality, you can use these inputs/outputs for reading and writing data from other devices.

To do this, select the connection, the address and the data format. You can manipulate the data further if necessary, so that it will be read correctly.

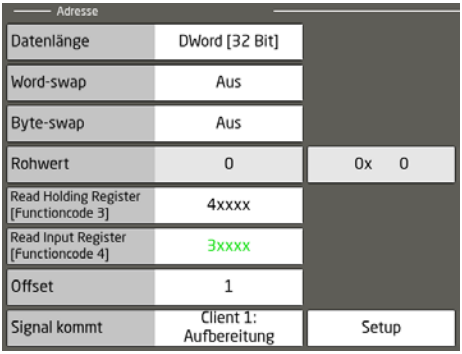
The burner signals allow signals from connected burner controls to be integrated in the system.

Please always pay attention to the instructions of the connected devices!

Modbus TCP client analogue input

The value can be read from an input or holding register as a 16- or 32-bit value.

Values can be scaled between limits, provided with a factor or interpreted as floats.



Modbus TCP client analogue output

The value can be written to a holding register as a 16- or 32-bit value.

Values can be scaled within limits, provided with a factor or interpreted and output as floats.

Modbus inputs/outputs

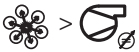
Modbus TCP client digital input

The value can be read from an input or coil.

Modbus TCP client digital output

You can assign a source to the digital output. The value can be written to a coil.

Burner analogue signal

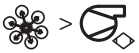


If a burner control is connected, certain signals from this can be integrated in the system. When you tap “Signal”, a list box of available signals opens.

You can set the unit and range individually.

The available signals differ depending on which burner control is used.

Burner digital signal



If a burner control is connected, certain signals from this can be integrated in the system. When you tap “Signal”, a list box of available signals opens.

Controllers

The SPECTOR*control* III can be used as a universal controller and be freely configured for different control tasks.

The possible uses are expanded by digital and analogue logical and calculation functions.

All controllers have an enable function. If the enable function is not active, the output is set to “**Closed**”. This allows the controller to be controlled based on external conditions.

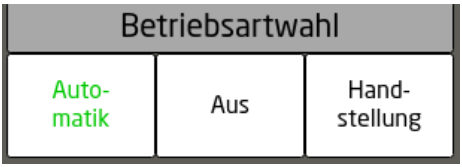
All controllers need an actual value signal and a setpoint.

The setpoint can either be defined in the controller itself or connected as an external signal.

In the interests of simplicity, all controllers with a positive control gain are described.

Mode selection

Mode selection allows you to set a controller or pump to “Off” (output at 0) or “Manual position” (output in any position).



ATTENTION

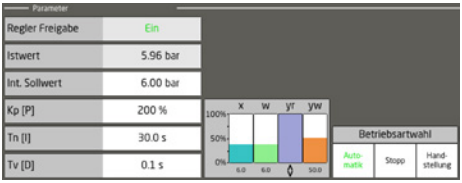
The enable signal does not function in Manual mode. The operator is responsible for safe operation!

Where other parameters are concerned, the controllers differ and are described separately here.

Brief description of individual controller types

Continuous controllers and 3-position stepping controllers

Continuous (PID) controllers include continuous and 3-position stepping controllers. They both function in the same way. Three-position stepping controllers feature an integrated positioner that generates digital output signals for “Open” and “Closed” and is suitable for actuating motorised valves without positioners.



Controllers

Parameter	Description
Direction of process variable	Positive = inlet control Negative = outflow control
Kp [P]	The P component adapts the controller gain to the controlled system. The larger the P component, the more strongly the controller will react to deviations.
Tn [I]	The I component or reset time Tn makes sure that control can take place without permanent deviation. The smaller the I component, the faster the controller will react to deviations.
Tv [D]	The D component responds to the rate of change of the actual value. When the setpoint is approached it “brakes”, preventing the controlled variable from overshooting. The larger the D component, the stronger the response.
Manipulated variable Min/Max	Limits the manipulated variable output to the set values. This can also be achieved dynamically via signals (e.g. calculations).
Dead zone	The effect of the dead zone is that the manipulated variable no longer changes when the setpoint plus/minus dead zone in % is reached.
Soft start	Soft start causes the controller setpoint to increase continually with an adjustable gradient. Soft start is enabled when the value is below the limit and the controller is enabled or switched from “Manual” to “Automatic”. If it is enabled, the calculated “Act. setpoint softstart” is shown.
Limit value	Soft start is active up to this value.
Gradient	The setpoint increases at this rate.
3-point stepping parameters	
Min. pulse	Minimum pulse duration for valve actuation.
Min. pause	Minimum pause duration for valve actuation.
Valve runtime	The internal positioner uses the valve runtime to calculate the position.

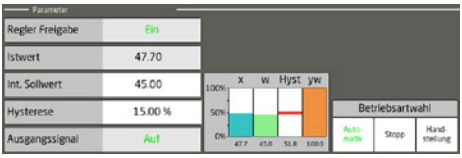
The valve runtime must be determined precisely.

Controllers

2-position controller

A digital output signal for actuating valves is generated as a function of setpoint and hysteresis.

If the setpoint has not yet been reached, the output is actuated until the actual value exceeds the hysteresis.

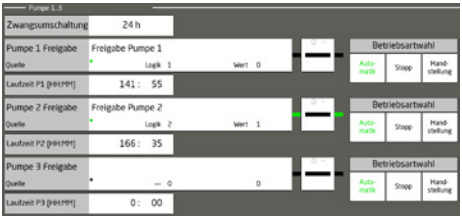


Parameter	Description
Hysteresis	Hysteresis is calculated as a percentage of the setpoint and together they form the operating range. When this value is exceeded, the output switches off.

Pump controller

The pump controller function is an extension to normal controllers and allows up to three pumps to be actuated. These are started, stopped and switched automatically based on their enable status and runtime.

- The pump with the shortest runtime is always selected.
- If the pump loses its enable during the request, the next pump is automatically selected.



Parameter	Description
Forced switchover	If the pumps were in uninterrupted operation during this time, the system switches to another pump. If the time is “0 h”, the function is not active.
Shutdown threshold	The pumps are not actuated if the value is below the threshold.
Enable	An enable signal must be assigned to each pump that is to be used.
Runtime	When the pump is actuated, the runtime is cumulated. You can adapt this manually.

Controllers

3-element controller

The 3-element controller function is an add-on for continuous and 3-position stepping controllers. The measured level is corrected based on the feedwater flow rate and the discharged steam flow rate, to compensate for measurement errors.

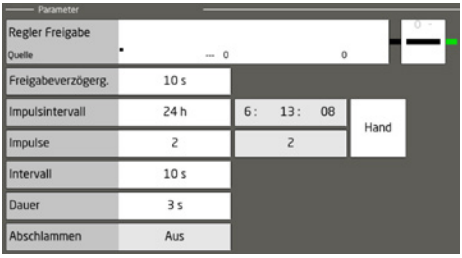
Parameter	Description
Weighting	This factor assesses to what extent the difference (steam flow rate/water flow rate) influences the measured level.

The same unit must be used for the steam and water flow rates.

The **3-element controller** and **pump controller** functions cannot be combined in one controller.

Intermittent blowdown controller

The intermittent blowdown controller actuates the intermittent blowdown valve. With “Controller enable”, blowdown (Desludging) can be interrupted, for example during downtimes.



Parameter	Description
Release delay	Time for which the enable signal is delayed
Pulse interval	Pause between two blowdown cycles
Pulses	Number of pulses of one blowdown cycle
Interval	Pause between two pulses
Duration	Pulse duration

You can start intermittent blowdown for a cycle using the Manual button.
This restarts the interval timer.

Continuous stepping controller

The controller can split its output signal into multiple stages, making it suitable for controlling electric heating bundles.

Up to 12 heating elements with 2 different power ratings can be controlled. In addition, one heating element can be controlled continuously.

The individual heating elements feature an enable input, which allows for fault-based switchover. The controller has an output signal for each heating element.

The outputs are controlled as follows. If the controller manipulated variable exceeds the power rating of a heating stage for the duration of the ON delay, a heating element is switched on. If it falls below the power rating for the duration of the OFF delay, it is switched off again. If two different heating stages are used, the system also switches between them as appropriate.

If there are several heating elements with the same power rating, they are operated in rotation. Thus, the element that was off the longest is switched on, and the element that was on the longest is switched off.

If a continuous heating element is installed, it is operated at the power rating between the fixed heating elements.

Example:

A heating element in heating stage 1 accounts for 20% of the total capacity. There are 3 elements, which means 60%.

A heating element in heating stage 2 accounts for 10% of the total capacity. There are 4 elements, which means 40%.

This results in a total capacity of 100% with 10% granularity.

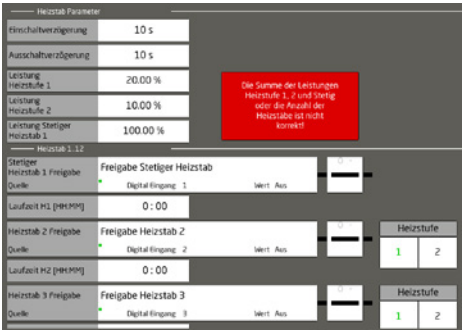
If we now replace a heating element in heating stage 2 by a continuous one at 10%, the total capacity remains the same. The control quality improves because the granularity is now 0.1%.

Parameter	Description
ON delay	Time until a heating element is switched on, when the manipulated variable is large enough
OFF delay	Time until a heating element is switched off, when the manipulated variable is too small
Power rating of heating stage 1	Power rating 0-100% of the total capacity per heating element
Power rating of heating stage 2	Power rating 0-100% of the total capacity per heating element
Power rating of continuous heating element 1	Power rating 0-100% of the total capacity

The power rating of heating stage 2 must be smaller than that of heating stage 1.

The total capacity must equal 100%!

If the system includes a continuous heating element, this is automatically assigned to heating element 1.



Flow rate (Quantity)

f(x) >

This function is used to show time-dependent values (e.g. from a steam calculator) as cumulated flow rates (Quantities). These are saved as cumulated daily/monthly/yearly and total flow rates.

- The data can be saved manually.
- Each flow rate is saved automatically on a monthly basis.
- A maximum of 12 months are saved. When a new year begins, the old datasets are overwritten month by month.
- The datasets contain the daily and monthly data.
- The data can be found on the SD card in "/DATA"

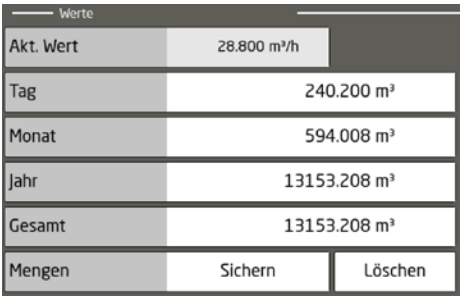
The name is formatted as follows:

- e.g. "Flowrate_1_Month_4.csv"
  for automatic backup
- e.g. "Flowrate_1.csv"
  for manual backup.

If the input signal has the wrong unit, a warning appears.

Deleting flow rates

The "**Quantities > Delete**" button resets all cumulated flow rates to zero.

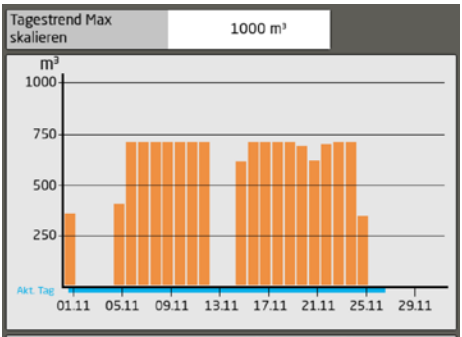


Graphic and tabular display

A graphic and tabular display of daily and monthly values is also available.

This shows the values from the last 30 days.

Analogue input signals and digital pulse signals can be processed.



Tag	Menge	Dim.
01.11.2024	353.808	m³
02.11.2024	0.000	m³
03.11.2024	0.000	m³
04.11.2024	0.000	m³
05.11.2024	399.214	m³
06.11.2024	708.582	m³
07.11.2024	708.392	m³

- The input signal must have a time-based unit,
  - such as x/h, x/m, x/s, W.
    These are taken from the analogue input signal or can be defined for pulse signals.
- In addition, for pulse signals you need to set the flow rate/pulse in Setup.
  - The input frequency is limited.
    Digital inputs that are analysed directly via the I/O terminal, up to 40 Hz (≥ 25 ms).
    For all other digital signals, e.g. the output signal of a logic circuit, the frequency must not exceed 1 Hz.
  - Calculation of a mean value smooths the pulses and produces an analogue signal.

The longer the time set for mean value calculation, the smoother the value, but the longer the delay.

The flow rates can also generate pulse signals.

To do this, you must enter the pulse value (pulse/flow rate) and length.

Functions

Steam calculator

f(x) >

The steam calculator calculates the steam mass flow and power in saturated steam and superheated steam systems. The calculation is based on the measured analogue process values for volume flow, temperature and/or pressure or the process data of a Spirax Sarco VLM/SLM 30 that is connected via Modbus RTU and was already calculated in the equipment.

Standard IAPWS-IF97 is used for calculating the steam mass and energy flow. Here, the density and enthalpy of the steam are calculated from the input variables for pressure and temperature.

The pressure range is 1 – 50 bar_g. The temperature range is 100 – 500 °C.

Procedure for saturated steam measurement

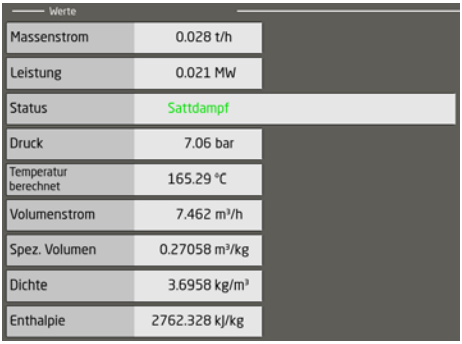
During saturated steam measurement, the missing value is calculated, i.e. the temperature in the case of pressure compensation.

Procedure for superheated steam measurement

During superheated steam measurement, the status changes – depending on the temperature and pressure – from water to saturated steam to superheated steam with a numerical temperature difference
of < / > from the calculated saturated steam temperature.

If water is detected, an error signal is issued and the outputs are set to “0”.

The relevant calculated values, specific volume, density and enthalpy are displayed under the values in the table. From these, the values for the steam flow rate and power are obtained.



Parameter

For the first five steam calculators, “Analogue” or “Modbus RTU” can be selected as the source.

Analogue: Configure the analogue inputs with the specific parameters.

Modbus RTU: A connected VLM 30 directly provides the mass flow rate and power rating. Additional equipment-specific data is displayed.

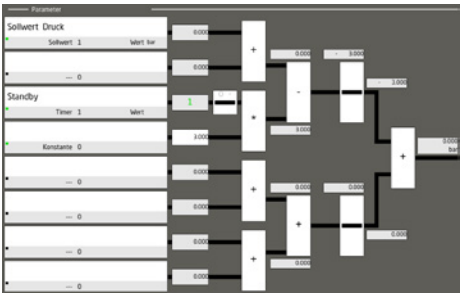
Functions

Calculation

$f_{(x)} > \sum$

A calculation links digital and analogue signals to form a new signal. This new signal can be provided with units, limits, ranges and alarms.

The output range can also be limited.



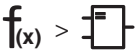
The following functions are available:

- Basic arithmetic operations
- Comparator and gate functions
- Square and root functions

Digital input signals can be inverted.

Icon	Description of function	
+	Addition	
-	Subtraction	The lower input is subtracted from the upper input.
*	Multiplication	
/	Division	The upper input is divided by the lower input.
≤	Smaller than or equal to	If the upper input is “smaller than or equal to” the lower input, the result is 1.
≥	Greater than or equal to	If the upper input is “greater than or equal to” the lower input, the result is 1.
DivR	Remainder of the division	The upper input is divided by the lower input.
MOD	Remainder of integer division	The upper input is divided by the lower input.
#0		If the upper input is smaller than the lower input, the result = the value of the upper input. Otherwise = 0
#1		If the upper input is smaller than the lower input, the result = the value of the upper input. Otherwise = 1

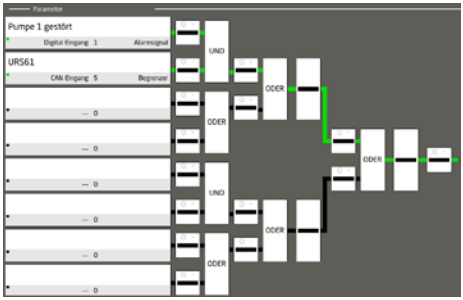
Logical function



A logical function links digital and analogue signals to form a new signal. These can be delayed, extended, negated, etc.

In addition, an alarm can be assigned to this new signal.

Analogue input signals > 1 are OFF.



Icon	Description of logical function
AND	AND operator
OR	OR operator
XOR	XOR operator
XNOR	XNOR operator
SR	Flip-flop upper input = Set lower input = Reset (priority)
TON	ON delay
TOF	OFF delay
TP	Pulse
RT	Rising edge
FT	Falling edge

Step chain

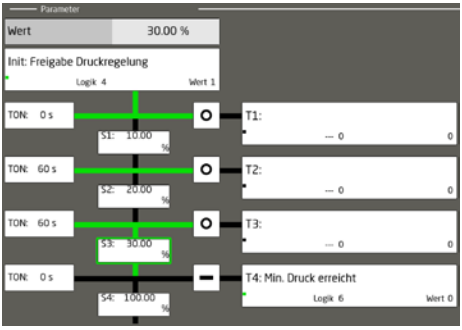
f(x) >

A step chain is a step-by-step control sequence.

The chain is initialised by a start condition. If this is “0”, the step chain returns to initialisation.

The rest of the sequence is mandatory; switching from one step to the next is dictated by conditions (transitions T1..T4).

If the condition of a transition is met, the delay is started. After this has elapsed, the corresponding value (S1..S4) is output.



The behaviour of the step chain can be defined as a “Loop” or “One-time”.

- After step 4, a loop restarts with step 1, if T1 = 1.
- If “One-time” is set, the step chain stops at step 4 until it is restarted with **Init**.

Timer

f(x) >

The timer is a weekly timer. Times can be set in 30-minute intervals.

Tap the input fields to enter intervals and click to enable the 30-minute intervals.

Maintenance

Maintenance determines the current runtime, switching cycles and switching cycles/60 minutes for the connected signal. You can set limits for these values.

- If a limit is set and the alarm input is enabled, evaluation takes place.
- If one of the set limits is exceeded, an alarm is entered in the alarm list.

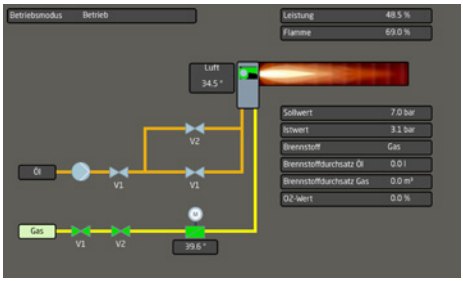
The runtime and switching cycles can be set individually.

“Switching cycles/60min” indicates how often the signal was switched in the last hour.

“**Switching cycles/60min**” can be used to analyse equipment such as a pump, for example. If it switches too often, this indicates that the controller in question has not been optimised.

	Aktuell	Alarmgrenze
Laufzeit [HH:MM]	205 : 34	200
Schaltzyklen	1	0
Schaltzyklen/ 60 min	1	0
Alarmeintrag	Ein	
Alarmgruppe[n]	1 2 3 4 5 6 7 8	

Burners



If a burner control is connected and enabled, you can navigate to a burner overview page from the home screen.

There, you will find further pages containing information and possible settings,

including information on input and output signals and error and alarm histories.

- You can also configure signal transmission to the burner control (enable signals, setpoints) here.
- Enter communication settings in Network and Connections.

Siemens (Landis & Stefa)

LMV5 and LMV2/3 burner controls can be connected.

Depending on the version, not all parameters may be available.

If the control (AZL) is set to “Remote”, values can be transferred from the SPECTOR*control* III (Remote) to the burner control and used to define the fuel and setpoint. This way, a controller from the SPECTOR*control* can be used to control the power, for example.

Parameter	Available	Remote
Current fuel (oil/gas)	X	-
Oil/gas switchover	-	X
Setpoint W1	X	-
Setpoint W2	X	-
Setpoint W3	X	X
Modbus mode	X	-
Burner enable	-	X
Set power	-	X
Set time	X	-

Burners

Lamtec

Most Lamtec burner controls offer greater flexibility in their design. The view in the SPECTOR*control* III must therefore be configured appropriately.

The fuel channels can be named based on their function, and then assigned.

Values can be transferred from the SPECTOR*control* III to the burner control and used to define the fuel or setpoint, for example. Power can also be controlled in this way.

Depending on the version, not all parameters may be available.

Parameter	RTU	CMS	BT300
Select fuel	X	X	X
Set load	X	X	X
Burner On (enable)	X	X	X
Power controller setpoint		X	X
Fault reset		X	
Burner enable		X	

Alarms

The SPECTOR*control* III provides alarms generated in the unit with timestamps for **Come**, **Gone** and **Quit** (acknowledged) and saves them in a ring buffer.

For the meaning of the E.xxx error numbers, please see the table at the end of this Manual.

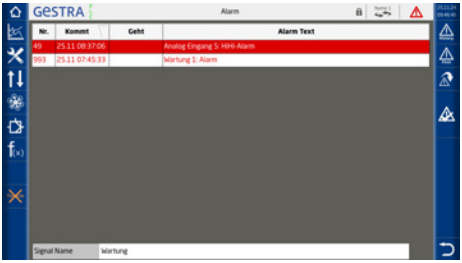
Open the alarm screen.

Do this by tapping the alarm button at the top right. This screen shows active and unacknowledged alarms.

You can change the table layout by clicking the top line of the "**No.**, **Come**, **Gone** and **Alarm text**" columns.

When you highlight an alarm entry, the name of the signal is shown at the bottom.

Tap the button to open the required screen.



Alarm history

> History

Open the alarm history.

Alarms continue to be available in the alarm history later on, and can be analysed and exported there.

You can filter the history, e.g. for "unacknowledged alarms", using the Filter button.

The stored .csv file is located in the "/DATA" folder.

First-up signal

> First

Call the first-up signal.

The first-up signal can be enabled for all digital inputs.

This allows you to determine the sequence of accumulated digital alarms.

The accuracy is ≥ 10 ms. You must enable the first-up signal for the required digital inputs. Eight first-up signals can be displayed in a list.

Acknowledging alarms

>

Alarms have been acknowledged.

This timestamp is only shown in the alarm history. If the alarm has "gone", it is deleted from the list once it has been acknowledged.

Security updates

GESTRA provides users with the relevant security updates in the Support area of the GESTRA homepage (Resources).

Alternatively, you can register your product at the following URL and receive information on updates via email:

https://www.gestra.com/resources/pages/sil

Updating the SPECTOR*control*

This section explains how to perform an update. It is not possible to account for every possible scenario here.

⚠ ATTENTION

It is not possible to account for every possible scenario here. Generally speaking, the following applies:

- Always create a backup before any update.
- Bring the plant into a safe operating state.
- Prevent the plant from starting automatically.
- Read the changelog and instructions provided with the update.
- After the update, check that the plant is functioning correctly.

There are two types of update.

Firmware

The firmware is the unit's Linux operating system plus the services and programs running on it. It is responsible for system functions and security. This update has no impact on the application (configuration). The firmware is supplied as a file ending in "*.swu". The file name tells you the version.

SPECTOR*control*

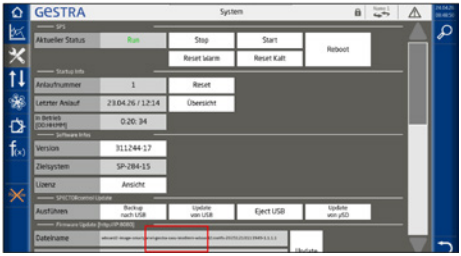
The SPECTORcontrol is responsible for the user interface and its functions. An update can be used to implement new functions or fix bugs. The parameter settings need to be reloaded afterwards.

The update consists of the folders containing the relevant files.

Updating the SPECTOR*control*

Procedure

There are various ways of performing a update, which are described individually here. There are differences in the necessary equipment and requirements. You must decide which method best suits your needs.



⚠ ATTENTION

Regardless of which method you choose, the configuration must always be saved and a backup created!

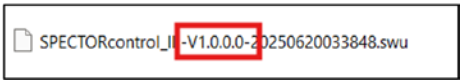
1. To do this, save the configuration in “Settings > Save/Load”
2. Also save the backup in “Settings > System”.
3. Alternatively, you can create the backup via FTPs.

Checking the firmware version

You can see the installed firmware version in “System” (red box). Compare this with the version in the update. If there is a newer version, please refer to the instruction .pdf file for how to proceed with an update. The file is located in the Update folder.

If the new version is not mentioned, update the firmware first.

Version information in the firmware file:



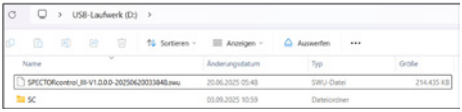
Updating the SPECTOR*control*

USB update

Required equipment:

- USB stick (FAT32) for the backup
- USB stick (FAT32) for the update
- Update files
- Laptop

1. Prepare the update USB stick with the update files.
2. To do this, copy the files into the “SC” folder you created earlier.



⚠ ATTENTION

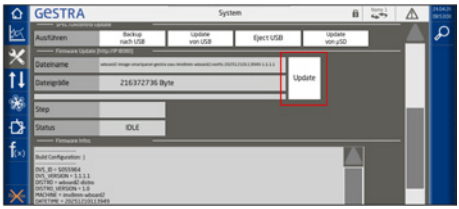
There must not be a Data folder in the Update folder.

This folder contains all the plant-specific data!

Firmware update

USB

1. If the USB stick containing the update has been recognised, the “Update” button appears. Tap this button to begin the update.
   - Once the update has successfully been completed, a “Reboot” button immediately appears next to the “Update” button.
2. Confirm by tapping this “Reboot” button.



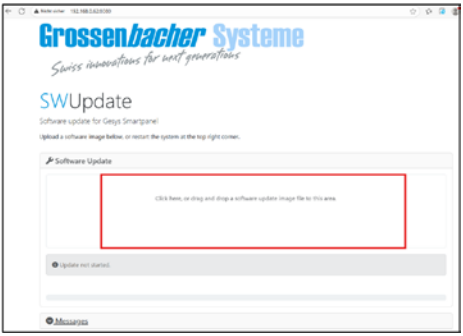
Updating the SPECTOR*control*

Browser

If the unit is connected to a network, you can also carry out the firmware update remotely via a browser.

1. To do this, enable this function on the unit.
   The function is only enabled for 10 minutes and is also automatically disabled by a reboot.
2. To open the page, add port 8080 to the unit's IP address. For example "http://192.168.0.99:8080"

3. You can then drag and drop the firmware file into the box, and the transfer will begin.
4. When the transfer is complete, the update will be installed and the unit will restart.



Updating the SPECTOR*control*

SPECTOR*control* update

If you see the following window on your monitor, you must perform a hard reboot by switching off the power supply!

microSD card

The easiest way is to write the data directly to the microSD card on the PC.

1. Switch off the SPECTORcontrol and wait 10 s.
2. Press the card to remove it from the unit (from behind: left-hand side).
3. Create a backup on the PC.
4. Overwrite the two folders “Codesyscontrol” and “epam4”.

   These folders must be overwritten completely.
5. Re-insert the card in the unit and reboot.
6. Load the configuration in “Settings > Save/Load”.

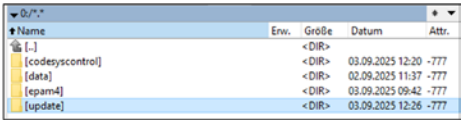
USB

Hard reboots are required for the update procedure.

1. Carry out a reboot before starting the update.
2. If the USB stick prepared for the update is inserted in the unit, you can initiate the update using the “Update from USB” button.
3. After the transfer, reboot the unit to install the update.

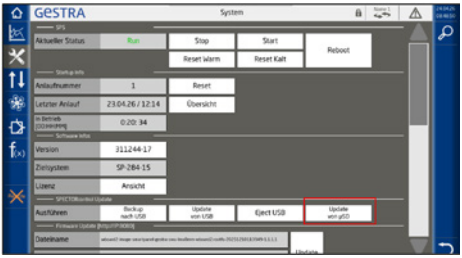
FTPs

If “FTPs” is enabled and you have network access (port 21), you can also carry out the update using this method.



1. You can create the backup by copying the data from the equipment.
2. Copy the update files into an “update” folder on the equipment.
3. When transfer is complete, start the update via the user interface.

   To do this, tap the “Update from microSD” button.
4. After this, carry out a reboot.



Cleaning and maintenance

Clean the equipment at regular intervals to keep it in perfect working order.

- Before cleaning, switch off the power supply to the equipment (the higher-level machine/plant) or

  > Open the “Screen cleaning” page.

- For cleaning, do not use a coarse cleaning cloth or cleaning agents containing abrasive powder or solvents.
- Take suitable steps to prevent electrostatic discharge during all work on the equipment.

Repairs to the equipment may only be carried out by GESTRA.
We cannot accept any liability for any changes made to the equipment that are not described in this document.

System malfunctions

Indications, diagnosis and remedies

Please check the following before running diagnostics:

The supply voltage:
To ensure trouble-free operation, all bus nodes are supplied with power via an external power supply. This power supply must be reliably isolated from connected loads.
Do not use the bus power supply to GESTRA control units for supplying power to the SPECTOR*control* III or connected devices.

The correct wiring:
Does the wiring conform to the wiring diagram?

System malfunctions

Diagnostics

Error	Remedy
Faulty display	■ Open the home screen again
Wago I/O module: communication problem	■ Is the node ID/baud rate correct (50kB/ID: 126)? ■ Is the end terminal plugged in? ■ Is the internal power consumption within the specified limits?
Warning alarm “Controller xx: Manual mode”	■ The controller is in Manual mode.
Modbus TCP communication cannot be established with the burner	■ Are the Modbus and IP parameters correctly set? See Lamtec documentation.
Modbus TCP: communication problem	■ Is the IP address correctly set? ■ Test communication on your computer using a test program.
CAN bus communication error	■ Have the installation specifications been complied with? ■ Can you measure a resistance of approx. 60 Ω between CAN-H and CAN-L?

Please pay attention to the instructions of the connected devices.

What to do about high-frequency interference

High-frequency interference can be caused by out-of-phase switching operations, for example.

If such interference occurs and results in sporadic failure, we recommend taking the following action to suppress interference:

- Provide inductive loads with interference suppression (RC combination) as per the manufacturer’s specification.
- Route bus lines separately from power lines.
- Increase the distance from interfering loads.
- Check the shield connection to the central earthing point (CEP) in the control cabinet.
- Suppress HF interference using hinged-shell ferrite rings.

In the event of interference or faults that cannot be remedied with the aid of this Installation & Operating Manual, please contact our service centre or authorised agent in your country.

System malfunctions

Error codes in SPECTOR*connect* equipment

Error codes for the URS 60/URS 61 safety control unit			
Error code	**Internal designation**	**Possible errors**	**Remedy**
E.006	ProbeCntErr	No electrode configured	Check code switch
E.007	DipKonfErr	Inconsistent code switch setting	Check code switch
E.008	Ch1Ch2DiffErr	EMC or internal error	Check installation location Replace safety control unit
E.009	Relais1Err	Error in relay 1	Check installation location Replace safety control unit
E.010	Relais2Err	Error in relay 2	Check installation location Replace safety control unit
E.012	DoubleStandByErr	Two electrodes are bridged	Check both monitoring units (SRL 6-60)
E.013	Probe1Err	Collective fault in channel 1	Check channel 1
E.014	Probe2Err	Collective fault in channel 2	Check channel 2
E.015	Probe3Err	Collective fault in channel 3	Check channel 3
E.016	Probe4Err	Collective fault in channel 4	Check channel 4
E.019	V6Err	EMC or voltage error	Check installation location Replace safety control unit
E.020	V5Err	EMC or voltage error	Check installation location Replace safety control unit
E.021	V3Err	EMC or voltage error	Check installation location Replace safety control unit
E.022	V1Err	EMC or voltage error	Check installation location Replace safety control unit
E.023	V12Err	EMC or voltage error	Check installation location Replace safety control unit
E.024	CANErr	Incorrect baud rate or wiring fault	Check baud rate, wiring and terminating resistors
E.025	ESMG1 (µC1Err)	EMC error or internal processor error	Check installation location Replace safety control unit
E.026	BIST (SelftestErr)	EMC or internal error	Check installation location Replace safety control unit

All error codes from E.001 to E027 not listed here are reserves

Error codes for:		NRR 2-60/NRR 2-61 level controller LRR 1-60 conductivity controller URW 60 universal converter	
Error code	**Internal designation**	**Possible errors**	**Remedy**
E.004	PlausSwitch-pointErr	MIN switchpoint higher than MAX switchpoint	Reset the switchpoints
E.005	InitTestErr	Internal error	Reboot equipment and replace if necessary
E.006	WalkThrough-AppErr	Internal error	Reboot equipment and replace if necessary
E.007	WalkThroughT-estErr	Internal error	Reboot equipment and replace if necessary
E.008	PlausSteamErr	Implausible measuring range settings Steam flow rate: Min > Max	Check/reset steam flow rate measuring range
E.009	PlausWaterErr	Implausible measuring range settings Feedwater flow rate: Min > Max	Check/reset feedwater flow rate measuring range
E.010	PlausPotiErr	Implausible calibration points Valve: CLOSED (0%) > OPEN (100%)	Check the Valve CLOSED (0%) and Valve OPEN (100%) calibration points
E.011	PlausErr	Implausible measuring range settings Min > Max	Check/reset measuring range
E.012	ProbeCommErr	Breakdown in communication with electrode	Check baud rate, group number, wiring and terminating resistors
E.013	OvertempErr	Ambient temperature of electrode > 75 °C	Check electrode installation location Lower the ambient temperature at the elec-trode terminal box
E.014	ProbeStoerungErr	General electrode error	Check the electrode
E.015	SteamMinErr	Steam flow rate Measuring current < 4 mA	Check steam flow sensor and replace if necessary Check electrical connection
E.016	SteamMaxErr	Steam flow rate Measuring current < 20 mA	Check steam flow sensor and replace if necessary Check electrical connection
E.017	FeedwaterMinErr	Feedwater flow rate Measuring current < 4 mA	Check feedwater flow sensor and replace if necessary Check electrical connection

Error codes for:		NRR 2-60/NRR 2-61 level controller LRR 1-60 conductivity controller URW 60 universal converter	
E.018	FeedwaterMaxErr	Feedwater flow rate Measuring current > 20 mA	Check feedwater flow sensor and replace if necessary Check electrical connection
E.019	ProbeLFShort-OpenErr	Faulty conductivity electrode (sensor break or short circuit)	Check conductivity electrode and replace if necessary Check electrical connection
E.020	ProbePtShort-OpenErr	Faulty Pt1000 temperature sensor (sensor break or short circuit)	Check Pt1000 temperature sensor and replace if necessary Check electrical connection
E.021	MinErr	Measuring current < 4 mA	Check flow sensor and replace if necessary Check electrical connection
E.022	MaxErr	Measuring current > 20 mA	Check flow sensor and replace if necessary Check electrical connection
E.024	CANErr	Incorrect baud rate or wiring fault	Check baud rate, group number, wiring and terminating resistors
E.025	Pump1Err	Pump 1 output too low or pump faulty	Check the controller parameters and switching thresholds of the pumps Check the electrical connection of the pump Replace pump if necessary
E.026	Pump2Err	Pump 2 output too low or pump faulty	Check the controller parameters and switching thresholds of the pumps Check the electrical connection of the pump Replace pump if necessary

All error codes from E.001 to E027 not listed here are reserves

Taking out of service

1. Switch off the supply voltage and secure so it cannot be switched back on.
2. Unplug the mains connector from the equipment.
3. Remove all plug and socket connections (e.g. CAN bus line, Ethernet connection, etc.).
4. Undo the mounting screws and remove the retaining clips.
5. Carefully push the equipment out of the cutout in the door of the control cabinet.

Disposal

Dispose of the equipment in accordance with statutory waste disposal regulations.

Special materials in the equipment

- Lithium battery, CR1225 button cell

Note on open-source software

GESTRA will provide every third party that contacts them at the address below with a complete, machine-readable copy of the source code (as defined in the corresponding licence) and the installation instructions (if available and as defined in the corresponding licence) of the open-source components that are subject to LGPL, GPL or other licences with similar obligations. It shall do this for a minimum of three (3) years from the delivery of this product (and, if provided for in the corresponding licence, for the period during which this product is officially supported by GESTRA) and for a fee that will not exceed the cost of the physically distributed source code.

Contact address: info@de.gestra.com

Please state the name of the product and the firmware version for which you require the source code, and let us know how we can best contact you.

Declaration of Conformity; Standards and Directives

You can find details on the conformity of the equipment and the applicable standards and directives, where

applicable, in the Declaration of Conformity and associated certificates and approvals.

The valid Declaration of Conformity is available to download at www.gestra.com. You can request the associated certificates and approvals by writing to the following address:

GESTRA GmbH

Münchener Straße 77
28215 Bremen
Germany
Tel. +49 421 3503 0
Fax +49 421 3503 393
e-mail info@de.gestra.com
Website www.gestra.com

Modifications to the equipment not approved by us will invalidate the Declarations of Conformity, certificates and approvals.

You can find our authorised agents around the world at:
www.gestra.com

GESTRA GmbH

Münchener Straße 77
28215 Bremen
Germany
Tel. +49 421 3503 0
Fax +49 421 3503 393
e-mail info@de.gestra.com
Website www.gestra.com

851127-01/08-2026cmw (809244-02) · GESTRA · Bremen · Printed in Germany