OEM Alpha direct Balance Switch and Balance Switch Modbus base stations

The OEM Alpha direct Balance Switch and Balance Switch Modbus base stations are the intelligent single room temperature controls of the future for maximum comfort and energy efficiency in panel heating systems. The OEM Alpha direct Balance Switch and Balance Switch Modbus base stations with integrated, TÜV-certified automatic hydraulic balancing carry out the balancing from the heating manifold completely independently and without additional hardware being connected.

Each time the supply voltage is switched on, a 30-minute commissioning mode is carried out. During this time, the controller signals are connected 1:1 through to the outputs. The pump contact works with the 2-minute turn-on delay and follow-up time. During these 30 minutes, the input signals are analysed and used to calculate the balancing that starts after the commissioning mode. The controller signals are also continuously analysed during operation and changes in the control behaviour are implemented.

The heat requirements of the various circuits are recorded by the algorithm, which distributes the opening times of the thermal valve actuators evenly over a defined period of time. This means that even in hydraulically unbalanced systems, all circuits are supplied with sufficient heat. This mode of operation is only used with inert heating systems such as panel heating systems.

Parameters, settings and special functions can be changed or executed via the NFC app or Modbus interface. The set parameters and settings can be read out via NFC or the Modbus interface.

Data is transferred between the smartphone and base station via NFC and does not require an internet connection. No registration or account is required to use the system. Data is transmitted between the base station and the building management system via Modbus RTU. For a detailed description of the registers, see section 4.4 Modbus register structure.

The OEM Alpha direct Balance Switch and Balance Switch Modbus base stations can also map cooling by inverting the input signals of standard heating controllers. Customary heating room controllers can be connected. This means that no special controllers are required for the heating/cooling function. The NC version of customary thermal valve actuators are used as final control elements.

1.1 Key features

- High-quality, modern OEM design
- OEM differentiation through appearance and function
- Version with 24 V 8 zones or 230 V 8 zones
- Integrated, TÜV-certified automatic hydraulic balancing
- Automatically detects the controllers connected
- Simple, intuitive installation and operation, without flow sensor and return sensor
- Status signalling via LEDs
- Connection for up to 12 valve actuators (can be freely assigned)
- Pump control and boiler control
- Connection for temperature limiter or dew point sensor and setback temperature input
- Tried-and-tested cable routing and strain relief
- Screwless plug-in connection / clamp connection technology
- Clearly arranged connection terminals
- High functional reliability
- Maintenance-free
- No initialisation or calibration necessary
- Cooling blocking can be defined per output
- App functionality
- Special functions (factory reset, ManualOpen, FirstOpen)
- Modbus connection for integration into building management systems (Balance Switch Modbus)

1.2 Variants

In the basic version, the OEM Alpha direct Balance Switch and Balance Switch Modbus base stations are delivered as neutral devices without logo and in grey, with transparent cover. The subsequent list shows the available versions.
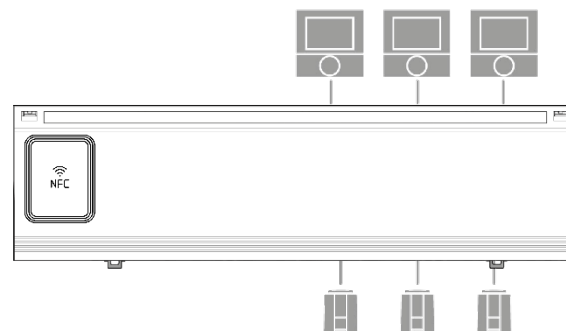
Type	Version	Operating voltage	Zones	Equipment	Scope of supply
B 41903-08N2	Balance Switch	24 V	8	Switch, heating/cooling, pump and boiler control, status signaling	OEM Alpha direct Balance Switch in single package Instructions in 12 languages
B 21903-08N2		230 V			
BM 41903-08N2	Balance Switch Modbus	24 V	8	Switch, heating/cooling, pump and boiler control, status signaling, Modbus RTU control	OEM Alpha direct Balance Switch Modbus in single package Instructions in 12 languages
BM 21903-08N2		230 V			

1.3 Optional extensions or differentiations to the basic version

Differentiation possibilities	
Packaging	Packaging can be manufactured and printed individually according to requirements.
Imprint on casing	Laser marking of the company logo and the individual type designation and your device designation
Casing	Bottom part – color adaptation Housing cover – Completely overlapping housing cover, individual color, transparency and shape
Please contact us if you have further wishes.	

Extension options	
DIN rail	The scope of delivery is extended by a DIN rail for installation in the heating circuit distributor

Möhlenhoff GmbH   ☎ +49 5341 8475 0
Museumstraße 54a   kontakt@moehlenhoff.de   137333.2507
38229 Salzgitter   www.moehlenhoff.de

Möhlenhoff

2   Technical data

Type	B 41903-08N2 / BM 41903-08N2	B 21903-08N2 / BM 21903-08N2
Operating voltage	24 V / ±20% / 50 Hz	230 V ±10%, 50 Hz
Power input (without pump/boiler)	Max. 50 VA	
Power consumption (idle)	<1 W	
Fuse	T2A	T4AH
Number of heating zones (HZ)	8	
Switching capacity per output/actuator	Max. 1 A	
Max. number of actuators	12 (freely assignable**)	
Switching current per actuator:	Max. 500 mA	
Pump connection	Closing contact (monopolar switching)	
Lead time/follow-up time	Parameterizable (default: 2 minutes)	
Switching power	2 A, 200 VA inductive	
Boiler connection	Closing contact (monopolar switching)	
Lead time/follow-up time	Parameterizable (default: 0 minutes)	
Switching power	2 A, 200 VA inductive	
Pump protection function	Parameterizable (default: 3 days / 5 min)	
Control direction normally closed (NC)/normally open (NO)	NC	
Ambient temperature	0 – 50 °C	
Storage/transport temperature	-20 °C – +70 °C	
Ambient humidity	5 to 80%, not condensing	
ERP class acc. to EU 811/2013	1=1 %	
Contamination degree	2	
Protection type	IP20	
Protection class	III	II
Function	Type 1 / Type 1.C	
Outer dimensions	90 x 326.5 x 52 mm	
Weight	465 g	600 g
Switching element design	TRIAC	
Overcharge protection	Current limitation via device fuse	
Setback input	Switchable via potential-free contact	
CO input	Switchable via potential-free contact	
Temperature limiter or dew point sensor	Switchable via potential-free normally closed contact	
Cover latch	Double latching of cover on casing, not to be opened without tools	
Valve protection function	Parameterizable (default: 16 days / 5 min)	
Connection terminals		
Line cross-section: massive	0.2 to 1.5 mm²	
Conductor cross section fine-stranded	0.2...1.5 mm²	
Conductor cross-section fine-stranded ADH	0.2...1 mm²	
Conductor cross-section fine-stranded ADH insulated	0.2...0.75 mm²	
Wire stripping length	8 to 9 mm	
Temperature for cone pressure test	550 °C	
Standards and regulations	EN 60730-1 / EN60730-2-9 / ElektroG resp. RoHS compliant	
Mains connection design	NYM connection terminals 3 x 1.5 mm²	
Strain relief	Integrated	
Casing material	ABS	
Type of installation	Wall installation/DIN rail (TS35/35 x 7.5 mm)	
Casing color	RAL7035 (light grey)	
Color of cover	Transparent, polished in the area of the LEDs	

**Outputs not short-circuit proof

Möhlenhoff GmbH   ☎ +49 5341 8475 0
Museumstraße 54a   kontakt@moehlenhoff.de   137333.2507   ꩜ **Möhlenhoff**
38229 Salzgitter   www.moehlenhoff.de

Display	
Heating zones LED	green (one LED per HZ)
Fuse LED	red
Power LED	green / red (two-coloured)
Pump LED	green
Boiler LED	green
Heating / cooling LED	blue
LED Modbus	flashing orange for Modbus activity

2.1 Dimensions

2.1.1 8 zone base station
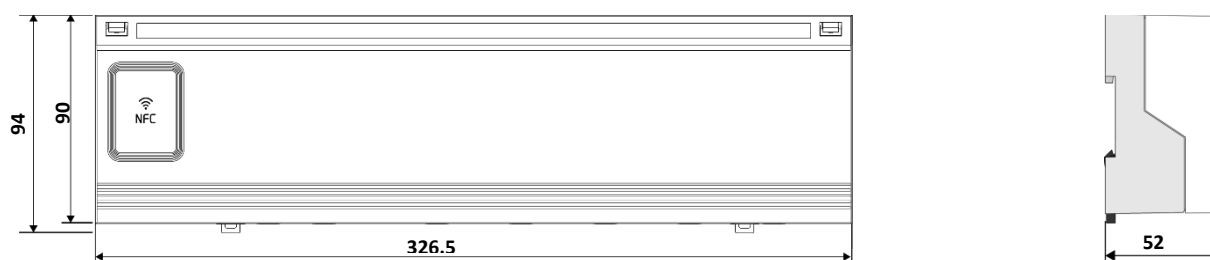
All indications in mm

3 App functionality

The OEM Alpha direct Balance Switch and Balance Switch Modbus base stations are equipped with an NFC chip (NFC: Near Field Communication). The functions and parameters of the base stations can be configured via the NFC chip in conjunction with the **Balance NFC app**.

The **Balance NFC app** must be used to configure the base station (download using the QR code).

3.1 NFC operations

3.1.1 Requirements for the use of NFC:

– Knowledge of the existence and position of the NFC interface in the mobile device: the position of the NFC interface varies depending on the model.
– Activated **NFC** function, deactivated display lock

Remove protective covers before using NFC. Ensure a stable hold to avoid disconnections. The distance required to establish an NFC connection depends on the mobile device used.

Further information on the steps to follow for specific models can be found in the manufacturer's instructions.

Some functions require a re-initialisation of the OEM Alpha direct Balance Switch and Balance Switch Modbus base stations. The app is self-explanatory. It is recommended that you follow the instructions in the app.
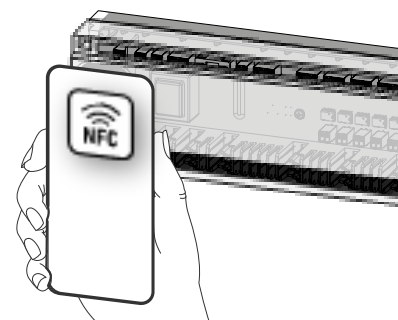
3.2 App functions

Function	Description	Display
Configuration		
Name rooms	Select room designation for each heating zone from a list (e.g. storage room, hobby room, living room, kitchen)	
Assign valve actuators	Free assignment of valve actuators to heating zones Cooling can be blocked individually for each actuator.	

Möhlenhoff

Parameters and protection functions	Selection of parameters / protection functions for - boiler - pump - valves - Modbus Possible parameters / protection functions: - Turn-on delay - Follow-up time - Pump protection - Valve protection - Baud rate / parity / address	
Writing and reading		
Write		
Write configuration to device	Settings are written to the OEM Alpha direct Balance Switch and Balance Switch Modbus base stations	Ready to scan: **Hold your smartphone close to the NFC tag** Display: **The configuration has been successfully transferred to the device.** or **Error message** → Repeat the process: The mobile device was moved too early or needs to be aligned more precisely.
Save configuration as template	Settings read in are saved as a file in the memory of the mobile device. Possible use of the file: read in the configuration at a later time.	Please enter a file name under which the current configuration is to be saved.
Read		
Read configuration from device	Read out the settings of the OEM Alpha direct Balance Switch and Balance Switch Modbus base stations	Ready to scan: **Hold your smartphone close to the NFC tag** **If the readout is successful, the configuration that has been read out is displayed in the app.** or **Error message** → Repeat the process: The mobile device was moved too early or needs to be aligned more precisely.
Load template file	**Requirement for use:** Configuration saved on the mobile device as a template. Options for storing a file on the mobile device: − Save stored file using the command **Save configuration as template**	Load template file → Display of saved template files
Share		
Share current configuration as PDF	Creates a document (PDF) with the data of the current configuration. The document can be distributed by means of appropriate apps.	− Display of the file size and the apps available for distributing/saving the file.
Default values		
Reset configuration to default values (factory reset)	Option to reset the current configuration to default values.	**Are you sure you want to load the default values and overwrite the current configuration?**
Special functions		

Möhlenhoff GmbH
Museumstraße 54a
38229 Salzgitter

☏ +49 5341 8475 0
kontakt@moehlenhoff.de
www.moehlenhoff.de

137333.2507

Möhlenhoff

FirstOpen	Sets the OEM Alpha direct Balance Switch and Balance Switch Modbus base stations to FirstOpen mode. All outputs are activated for 10 minutes.	Ready to scan: **Hold your smartphone close to the NFC tag** → The FirstOpen function has been successfully activated. The power LED should flash alternately green and orange. In addition, the LEDs of all inputs should light up green. The system will switch back to normal operation in 10 minutes. or **Error message** → Repeat the process: The mobile device was moved too early or needs to be aligned more precisely.
ManualOpen	Opens selected valve actuators completely until the function is deactivated.	Ready to scan: **Hold your smartphone close to the NFC tag** → The ManualOpen function has been activated for the selected outputs. The power LED should flash alternately green and orange. The CO LED should also flash blue. or **Error message** → Repeat the process: The mobile device was moved too early or needs to be aligned more precisely.
Reset configuration to default values (base station factory reset)	Reset base station to default values. → The current configuration in the app remains unaffected.	Ready to scan: **Hold your smartphone close to the NFC tag** → The base station has been successfully reset to default values (factory reset). The power LED should flash red rapidly for five seconds while all other LEDs are switched off. or **Error message** → Repeat the process: The mobile device was moved too early or needs to be aligned more precisely.

Notes

All changes should only be made with the appropriate expertise. An incorrect setting can lead to the actuator malfunctioning, a control system fault and subsequent costs. The manufacturer accepts no responsibility for incorrect settings and their consequences.

Adoption of changes after restarting the OEM Alpha direct Balance Switch and Balance Switch Modbus base stations.

4   Presetting

The OEM Alpha direct Balance Switch and Balance Switch Modbus base stations can leave the factory with a customer-specific setting. The properties can be subsequently changed using the app; see the following section.

Function	Default	Optional
Assignment of actuators	− HZ 1: 1/2 − HZ 2: 3/4 − HZ 3: 5/6 − HZ 4: 7/8 − HZ 5: 9 − HZ 6: 10 − HZ 7: 11 − HZ 8: 12	− Freely parameterisable
Block cooling	− Deactivated for all valve actuators	− Can be activated for each individual valve actuator
Boiler / heat generator		
− Turn-on delay	− 0 min	− Freely selectable between 0 – 30 min (increment: 1 min)
− Follow-up time	− 0 min	− Freely selectable between 0 – 20 min (increment: 1 min)
Pump		
− Turn-on delay	− 2 min	− Freely selectable between 0 – 10 min (increment: 1 min)
− Follow-up time	− 2 min	− Freely selectable between 0 – 20 min (increment: 1 min)
− Protection functions	− Activated	− Can be activated / deactivated
− Duration until the protection function is activated	− 3 days	− Freely selectable between 1 – 16 days
− Activation duration	− 5 min	− Freely selectable between 0 – 20 min (increment: 1 min)
Valves		
− Protection functions	− Activated	− Can be activated / deactivated
− Duration until the protection function is activated	− 16 days	− Freely selectable between 1 – 16 days
− Activation duration	− 5 min	− Freely selectable between 0 – 10 min (increment: 1 min)

5   Modbus

Note

If the OEM Alpha direct Balance Switch Modbus base station is the last device in the Modbus network, a terminating resistor must be installed on site.

5.1   Modbus addresses

Default address: 01

Change of address: - Via app

                      - From the master via register access

Adoption of changes after restarting the OEM Alpha direct Balance Switch and Balance Switch Modbus base stations.

5.2   Modbus setting

Default settings for OEM Alpha direct Balance Switch and Balance Switch Modbus base stations

Address: 1

Interface: 38400 baud
                    Parity None: 2 stop bits
                    Opt: Parity Even / Odd: 1 stop bit

Setting the address / interface via

- NFC
- Modbus

Once the address, baud rate and termination have been set, the OEM Alpha direct Balance Switch and Balance Switch Modbus base stations can be put into operation via Modbus.

5.3   Modbus register

The Modbus register functionality can be used to change settings and control the devices; customer-specific settings are available.

The OEM Alpha direct Balance Switch and Balance Switch Modbus base stations work with the following function codes (commands):

0x03   (R) Read Holding Register in single / multiple mode

0x10   (W) Write Registers in single / multiple mode

These function codes can be used to write or read individual registers or 255 registers in one command.

The Modbus protocol used is compliant with the guidelines from: https://Modbus.org/specs.php

5.4   Modbus register structure
Default values of a standard article, customer-specific settings on request.

Register	Address	Command	Description
1 – 7	0x0000 – 0x0007	R	Serial number (UID) of the NFC chip (8 decimal values, 1 value per register)
8 – 15	0x0008 – 0x000F	R	Device type in plain text (8 characters, 1 character per register) e.g. "ADBS230"
16	0x0010	R	Major software version as a decimal value
17	0x0011	R	Minor software version as a decimal value
19	0x0013	R / W	**Changeover: Control via Modbus** **Bit 0 = 0**: Control changeover via external input **Bit 0 = 1**: Control changeover via Modbus **Bit 1 = 0**: Control changeover via Modbus inactive **Bit 1 = 1**: Control changeover via Modbus active **Bit 2 to bit 15**: reserved (can be used for pumps and / or boiler control in future)
20 – 31	0x0014 – 0x001F	R / W	Assignment of an input (room) to an output (one register for each output, starting with 0x0014 for output 1) 0 = No room assigned 1 – 8 = Room number (default = 1, 1, 2, 2, 3, 3, 4, 4, 5, 6, 7, 8) Persistent storage possible via initialisation command
32 – 43	0x0020 – 0x002B	R	Info for **PWM** output status (one register per output, starting with 0x0020 for output 1) Unit: % Value range: 0 – 100 Resolution: 1 Without participation in load balancing: Actuator control = 100 No actuator control = 0 PWM accuracy: ±2% Query operating mode via register 0x002E
44	0x002C	W	**Trigger commands:** 0 = No command 1 = Factory reset 2 = Initialisation 3 = FirstOpen function 4 = ManualOpen function (with parameter, see register 0x002D) 5 = Normal mode 6 = Input simulation (see register 0x0034 ... 0x003B) After executing the command: Value is set to 0.

Möhlenhoff

45	0x002D	R / W	Parameters for command in register 0x002C Current use for ManualOpen command: Bit mask for outputs to be activated, e.g. 0x00F0
46	0x002E	R	**Active mode** 0 = Normal 1 = FirstOpen 2 = ManualOpen 3 = Input simulation
47	0x002F	R / W	**Modbus address** 1 – 247 (default: 1) Persistent storage possible via initialisation command
48	0x0030	R / W	**Baud rate** 0 = 4800 1 = 9600 2 = 19200 3 = 38400 (default) Persistent storage possible via initialisation command
49	0x0031	R / W	**Parity** 0 = none* 1 = even (default) 2 = odd *automatically 2 stop bits Persistent storage possible via initialisation command
50	0x0032	R	**Information on whether outputs participate in load balancing** Bit 0: Output 1 Bit 1: Output 2 … Bit 11: Output 12 Bit = 0 → Load balancing inactive Bit = 1 → Load balancing active
51	0x0033	R	**Information on whether inputs participate in load balancing** Bit 0: Input 1 Bit 1: Input 2 … Bit 7: Input 8 Bit = 0 → Load balancing inactive Bit = 1 → Load balancing active
52 – 59	0x0034 – 0x003B	R / W	**Simulated PWM for the inputs** (one register for each input, starting with 0x0034 for input 1) Unit: % Value range: 0 – 100 Resolution: 1 Evaluation of the 8 registers in input simulation mode Default: pulse – pause ratio at the inputs **Cooling mode** Output of the output values of the load balancing at the outputs (no inversion) No participation in load balancing when: – PWM = 0% – PWM = 100% – Block cooling active for one output Status display via LED (→ input)
61	0x003D	R	**Heating / cooling mode** 0 = Heating 1 = Cooling
62	0x003E	R	**Pump status** 0 = Pump off 1 = Pump on
63	0x003F	R	**Boiler status** 0 = Boiler off 1 = Boiler on
64	0x0040	R	**Commissioning mode** 0 = Commissioning inactive

Möhlenhoff

				1 = Commissioning active
65	0x0041	R		**Dew point monitor / temperature limiter** 0 = Condensation / excess temperature detected 1 = Monitoring of the dew point / temperature monitoring active
66	0x0042	R		**Setback status** 0 = Setback inactive 1 = Setback active
67	0x0043	R / W		**Block cooling** Flag for each output Bit 0: Output 1 Bit 1: Output 2 … Bit 11: Output 12 Persistent storage possible via initialisation command

R: Read, W: Write

- − Register consisting of 16 bits
- − Data types:
  - Decimal
  - Bitmasks
  - Explicitly stated otherwise (e.g. device type in plain text)
- − Changes to persistent parameters saved AFTER the initialisation command

6   Approvals and certificates

All Möhlenhoff products are extensively tested and certified by independent testing institutes.

The CE identification documents that the products that the products placed on the market comply with the applicable requirements of the EU Directives.

The product is certified by TÜV Rheinland.

*Technical note:
Thermostats with a cycle time of more than 30 minutes are not suitable for adjustment with the Alpha direct Balance Switch System. When using such thermostats, the base station switches the thermostat signal 1:1 through to the actuator. The corresponding heating zone does not participate in the adjustment.
Commercially available thermostats use a cycle time of less than 30 minutes.