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AO4-DL

Vers. 1.00.1 EN

DL extension module for 4 analogue outputs

The **AO4-DL** module ("AO" = analogue output) enables an additional 4 analogue outputs for devices with X2 technology (e.g. UVR16x2, RSM610, CAN-I/O45).

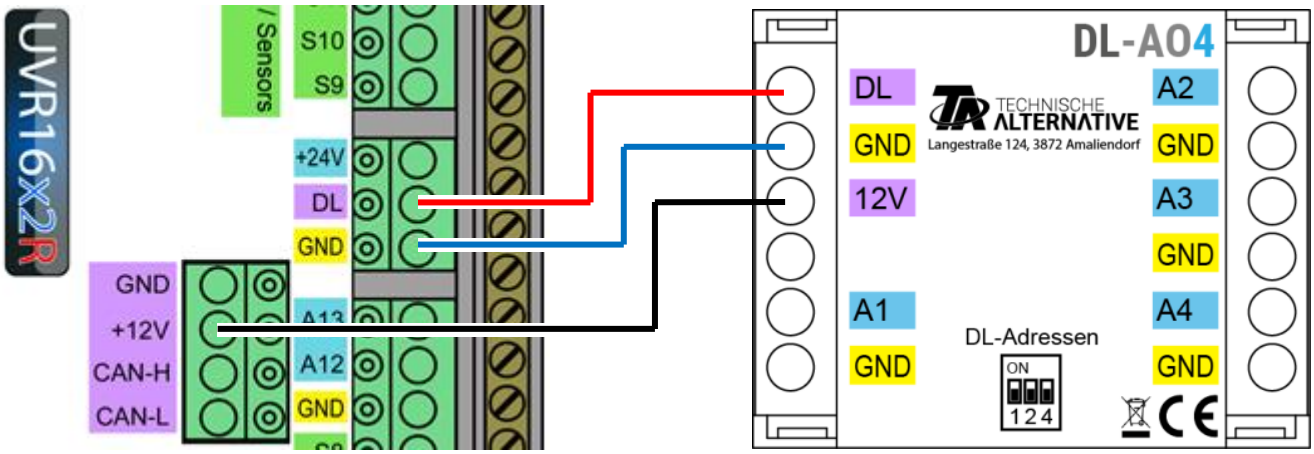
Communication with the controller takes place via the **DL bus**. Selecting an index allows you to choose 0-10 V or PWM **mode** for each individual output.

The power supply is provided by the **12 V output** of a UVR16x2 or RSM610 controller. The DL bus load of the module is therefore very low.

In conjunction with auxiliary relay modules (e.g. HIREL22), the AO4-DL module can also be used as an extension module for additional switching outputs.

Electrical connection

Example: Connection to a UVR16x2K controller



The principles of DL bus cabling are described extensively in the installation instructions for the freely programmable controllers.

DL address

Each DL bus device must have its **own address**.

The **address** is set using **DIP switches** on the PCB. These are accessible when the enclosure is open. In the delivered condition, address 1 is set (factory setting). Provided no other DL bus devices are connected to the DL bus, no change of address is required.

The effective address is derived from address 1 (= factory setting) plus the sum of all the values of the selected DIP switch settings.

Example: Required address 6 = 1 (from factory setting) + 1 + 4
= DIP switches 1 and 4 must be set to **ON**.

→ Correct position of DIP switches acc. to example.

Index

In order to control the required **output** in the correct **mode**, a DL output must be programmed in the X2 controller. The **address** and **index** must be specified for this.

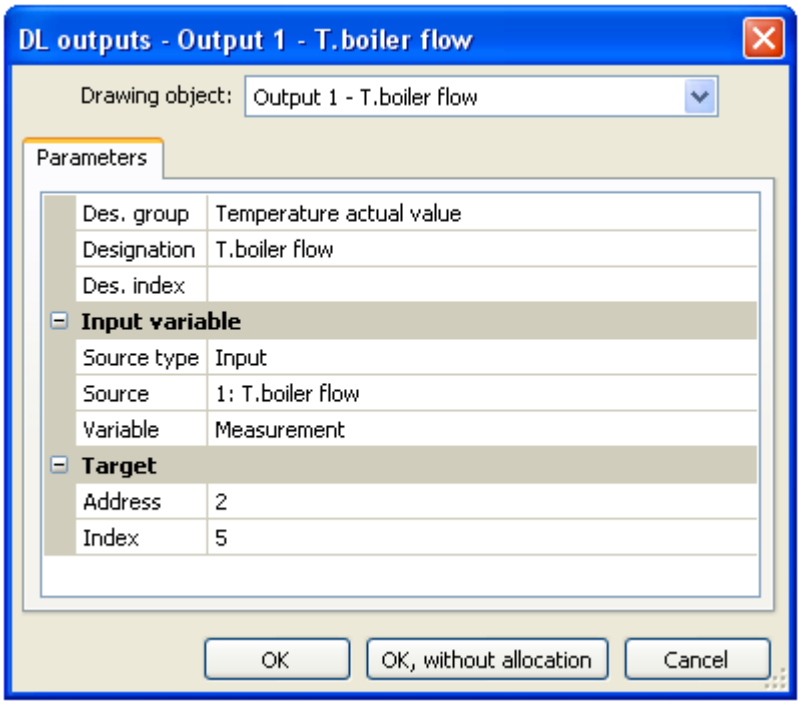
The **index** defines which analogue output should be controlled in which mode.

Index	*Analogue outp.*	*Mode*
1	A1	PWM
2	A2	PWM
3	A3	PWM
4	A4	PWM
5	A1	0-10V
6	A2	0-10V
7	A3	0-10V
8	A4	0-10V

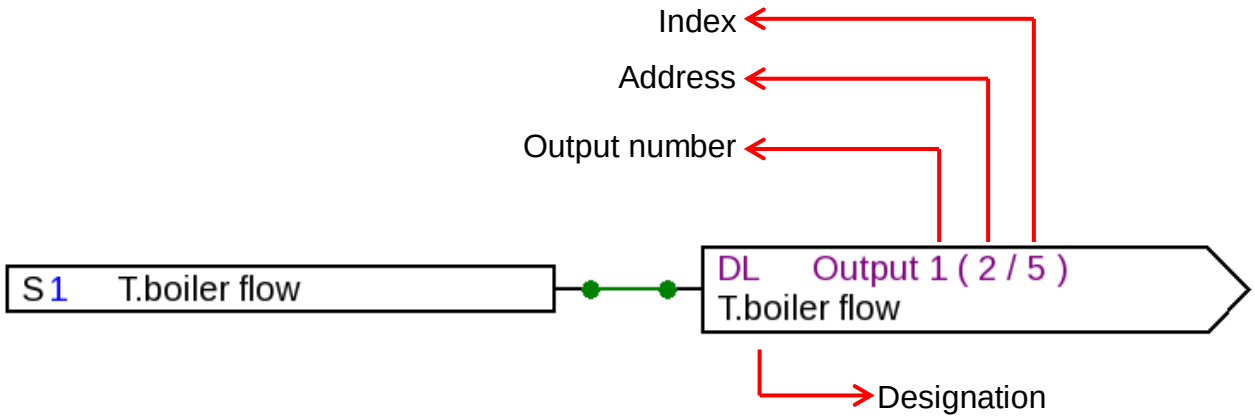
An output must not be controlled by both modes at the same time, as this can cause errors.

TAPPS2 programming

Example: Controlling the analogue output of a module through a sensor input, module address 2, output 1 in 0-10 V mode (= index 5)



The input variable of the DL output must be an **analogue** numerical value.



Output scale

The analogue outputs of the module have a **fixed scale**.

PWM mode		0-10 V mode	
0	0.0 %	0	0.00 V
1000	100.0 %	1000	10.00 V

All values are applied **without commas**.

Examples: A temperature value of 85.0 °C is issued as 85.0 % or 8.50 V; a pressure level of 3.52 bar is issued as 35.2 % or 3.52 V.
If the controller issues a value that would result in **more** than 100.0 % or 10.00 V in the module (e.g. 150.0 °C), the output value of the module is **limited** to 100.0 % or 10.00 V.

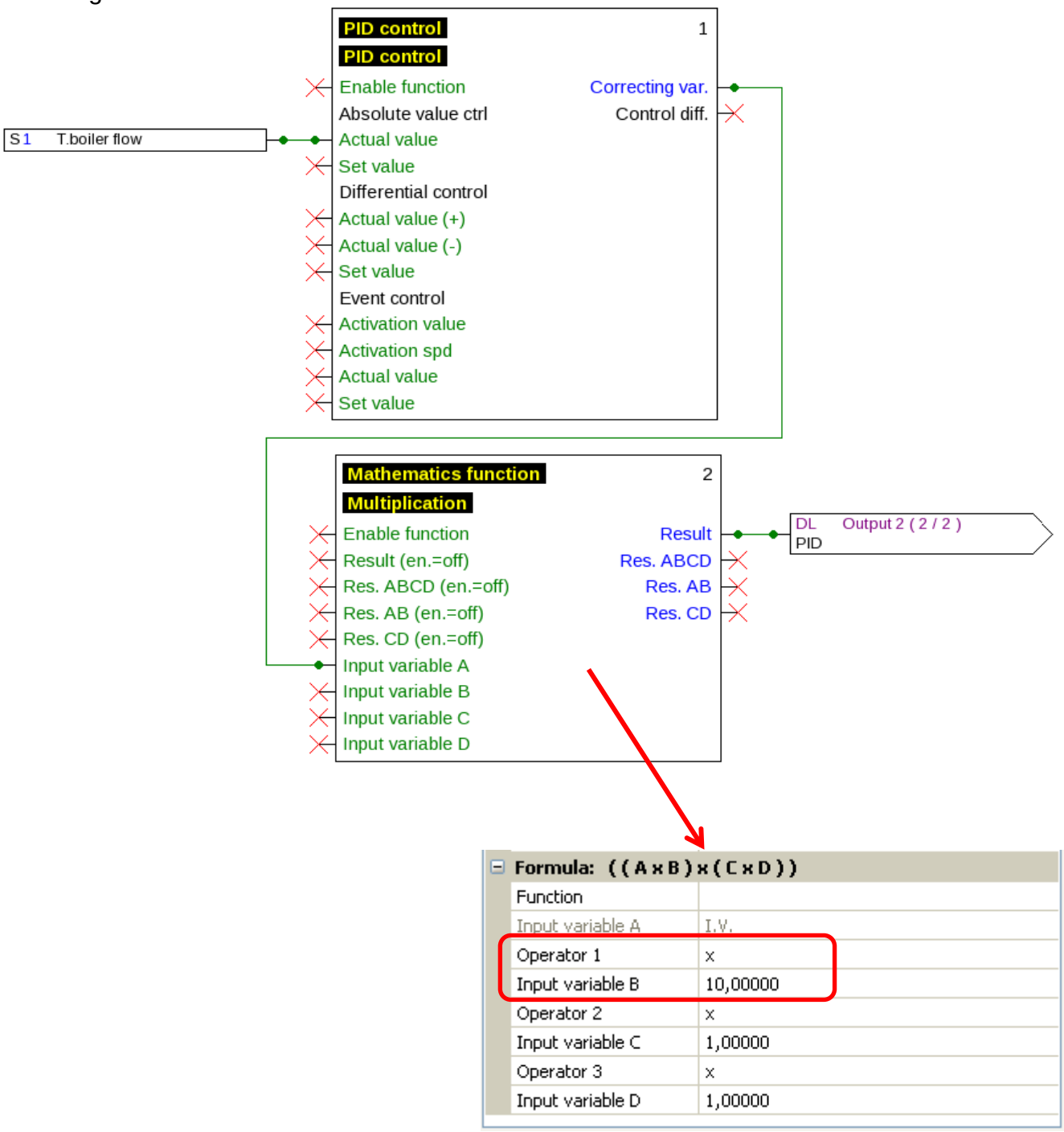
If the controller issues a **negative** value (e.g. -10.0 °C), the output value of the module is 0.0 % or 0.00 V.

A digital ON value is issued as 10.00 V; a digital OFF value is issued as 0.00 V. This means an auxiliary relay can be controlled.

Important note:

If the **correcting variable** of a **PID controller** is applied and the value of 100 is issued as 100.0 % or 10.00 V, a **scaling function** must be entered to adjust the correcting variable for the module.

Example: Issuing the PID correcting variable at output 2 of the AO4-DL with address 2 as a PWM signal



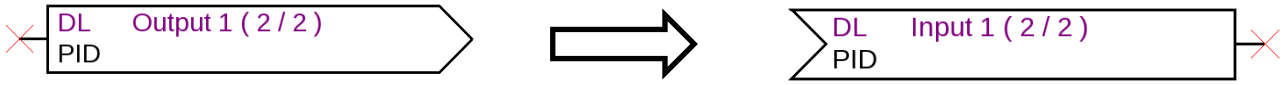
In the scaling function, a PID correcting variable of e.g. **60** results in **60.0 %**.

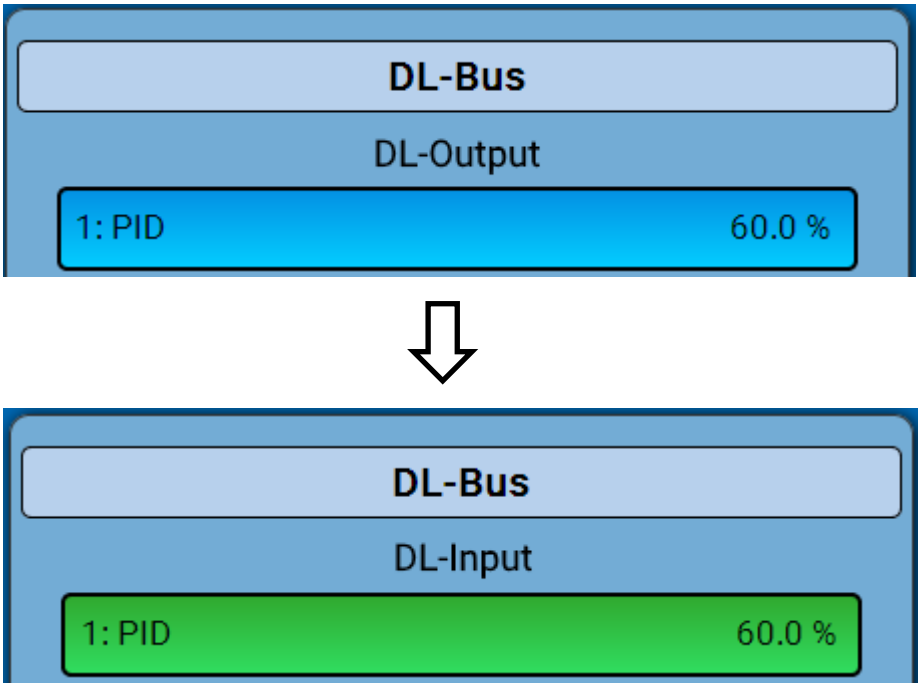
The module with address 2 consequently issues a PWM value of **85.0 %** at output 2.

Feedback

A DL input can be programmed in the controller to check the **value issued**.

Module output 1 - 4 can be queried, regardless of whether it is being operated in PWM or 0-10 V mode. As a result, only the indices 1 - 4 can be used for the query.





Timeout

If a controller does not issue a value to the module, 0.0 % or 0.00 V is issued **after one minute**.

In the DL input (feedback), the value 0 (no unit) is shown.

If the DL bus cable is **disconnected**, the module **immediately** issues 0.0 % or 0.00 V.

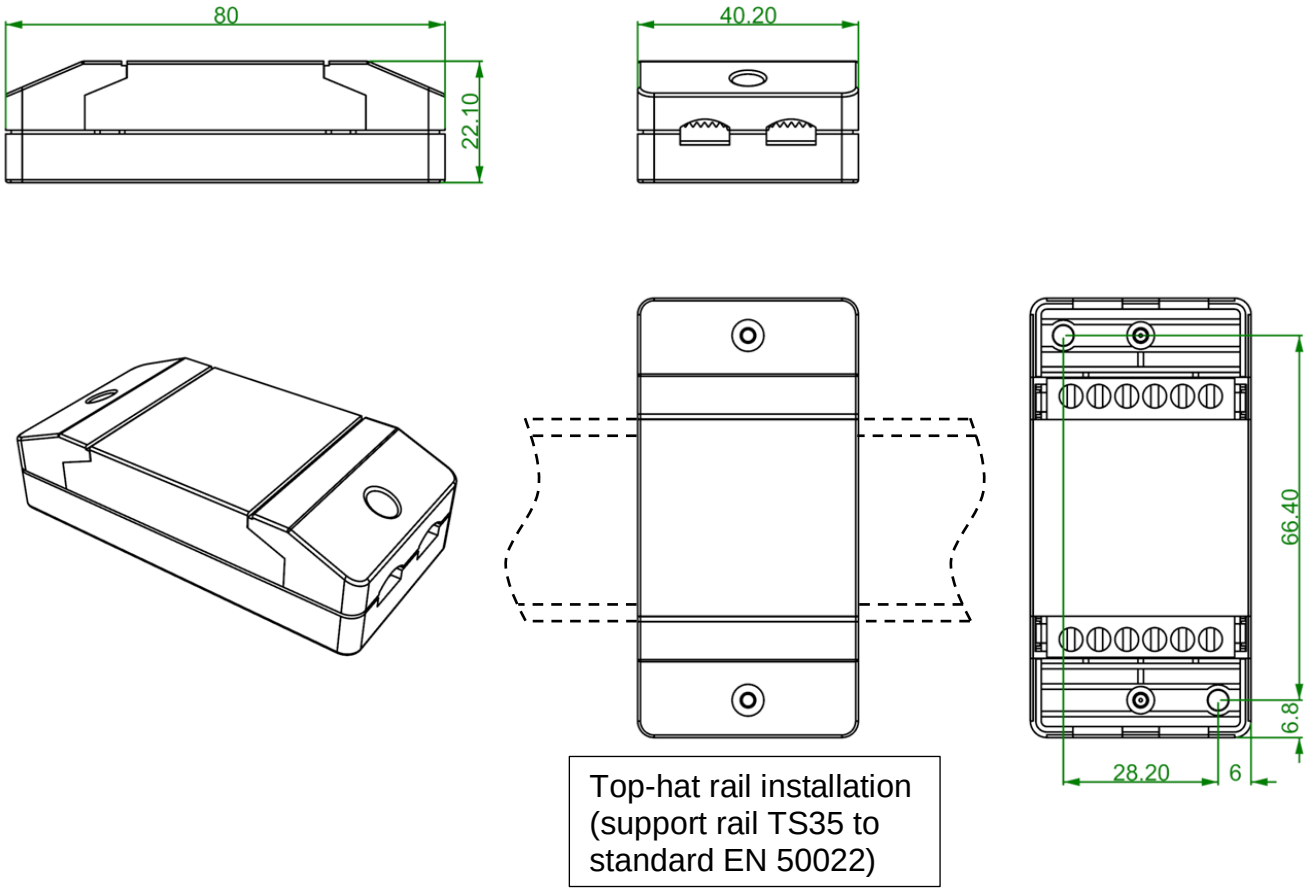
In the DL input (feedback), 0.0 % or 0.00 V is shown along with a red frame indicating the fault.

The network error for this DL input changes from No to Yes.

Important note!

The value is transmitted via the DL bus with a delay (= not immediately). With critical control loops (e.g. DHW heating), this delay must be observed, as it may not be possible to react to value changes quickly enough!

Dimensions in mm



Top-hat rail installation (support rail TS35 to standard EN 50022)

Technical data	
DL bus load	5 %
PWM signal	10 V / 1 kHz
IP rating	IP 40
Terminal area	Max. 1.5 mm²
Max. ambient temperature	45 °C
All outputs	Analogue outputs 0 - 10 V (max. 20 mA) or PWM (10 V/1 kHz) in 1000 stages each (= 0.01 V or 0.1 % per stage) or extension option as switching outputs with auxiliary relay modules

Subject to technical modifications