Application Note

Remote control of MXE Matrix Mix Engines via the MXE control port (GPIOs) using RDL (Radio Design Labs) analog control panels

MXE Matrix Mix Engines are equipped with a control port for interfacing to other systems, using analog control wiring and controls.
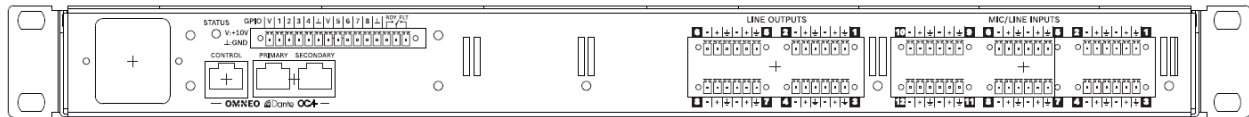

Image 1: MXE rear view

The control port (*GPIO*) can be found on the MXE's rear panel. It offers in total eight freely configurable *GPIO*s (General Purpose Inputs and Outputs), a Ready/Fault relay (*RDY/FLT*) and 10 V (*V*) and ground ($\perp$) reference pins.

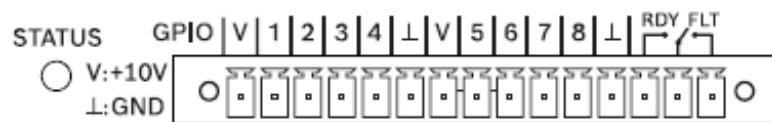The eight GPIOs can be configured via SONICUE as either Analog In, Digital In or Digital Out.

Image 2: MXE control port detail view

Requirements for using MXE Task Engine:

MXE Matrix Mix Engine with firmware version 1.4.3119 (or higher)

SONICUE Sound System Software 1.3.0 (or higher) installed on computer

RDL control panels (third party)

RDL's analog control panels are designed as "problem solvers" for simple control tasks.

All panels come in a range of colors, typically in white, black or stainless. Please refer to the RDL website for more information.

The following RDL analog control panels have been successfully tested with MXE:

- D‑RLC10K (white) Remote Level Control
    - Variants DB‑RLC10K (black), DS‑RLC10K (stainless)
- D‑RLC10M (white) Remote Level Control with Muting
    - Variants DB‑RLC10M (black), DS‑RLC10M (stainless)
- D‑RC4RU (white) 4‑Channel Remote Control
    - Variants DB‑RC4RU (black), DS‑RC4RU (stainless)
    - Please note that similar devices such as D/DS/DB‑RC4**M** are **not compatible**.

1. RDL D Series-RLC10K Remote Level Control (third party)

Product images

Image 3: D Series-RLC10K variants and rear view (right)

Brief description and application example

The D Series-RLC10K is a passive, analog *LEVEL* control panel based on a 10 kΩ potentiometer.

It features a knob with scale and can be used for controlling MXE DSP parameters – such as MXE input, output or zone levels – by applying a voltage of 0...10 V to one of the MXE's GPIs. This voltage is then translated by the MXE logic to a DSP level value.

As this is a passive design, no separate power supply is required.
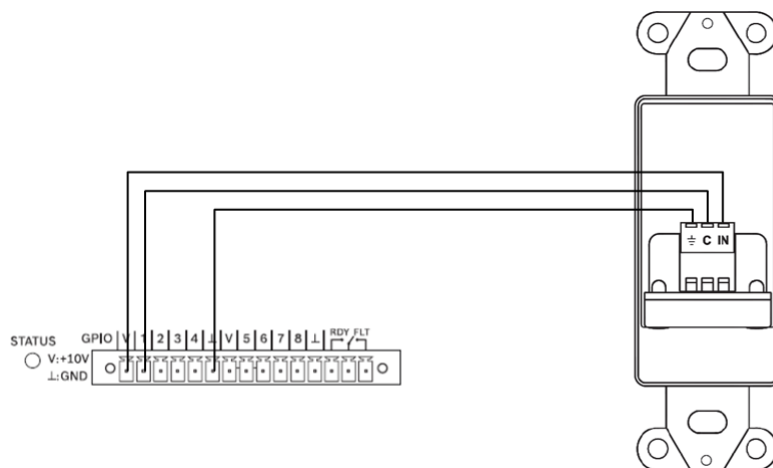
Basic set up – hardware wiring

Image 4: D Series-RLC10K wiring to MXE control port

Wiring table

Dynacord MXE control port pin	RDL D-RLC10K pin
V (10 V reference)	IN
GPI 1	C
⊥ (ground)	⊥ (ground)

Basic set up – software configuration

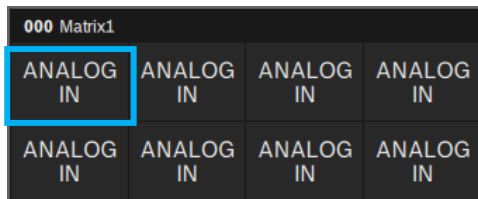In SONICUE under Setup>GPIO, the **MXE GPI1 needs to be configured as "GPI Analog"**.

Image 5: MXE GPIO Configuration

Then the MXE *Task Engine* must be programmed. To translate a GPI voltage (0…10 V) to a DSP level value (typically -80…18 dB), the following Task Engine structure with an *Analog Scaler* block can be used:
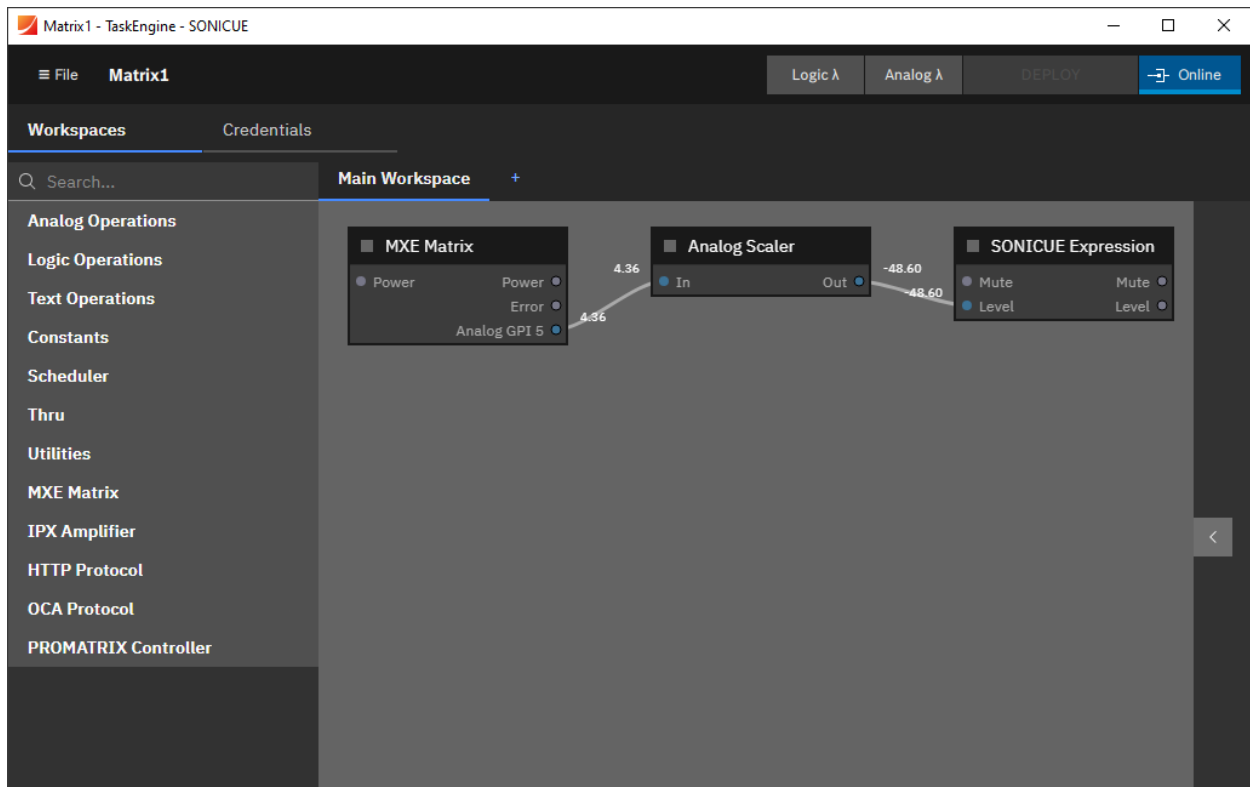

Image 6: MXE Task Engine structure with *Analog Scaler* block to translate a voltage at GPI1 to a level in DSP

See chapter *4. MXE Task Engine with Analog Scaler block* for more configuration details.

2. RDL D Series-RLC10M Remote Level Control with Mute (third party)

Product images

Image 7: D Series-RLC10M variants and rear view (right)

Brief description and application example

The D Series-RLC10M is an active, analog *LEVEL* plus *MUTE* control panel.

It features a rotary encoder with knob for *LEVEL* control and an LED ring as visual feedback of the level set, plus a separate *MUTE* button. The panel can be used for controlling MXE DSP parameters − such as input, output and zone level − by applying a voltage of 0…10 V to one of the MXE's GPIs. This voltage is then translated by the MXE logic to a DSP level value.

Pushing the *MUTE* button will set the output control voltage to 0V as longs as mute is active and back to the previous voltage when the *MUTE* button is pushed again. Thus for MXE mute means the lowest MXE DSP level programmed via MXE logic for the 0…10V input voltage range.

As this is an active electronic design, a separate 24 V DC power supply is required. For testing the power supply (24 Vdc, 500 mA) has been used.
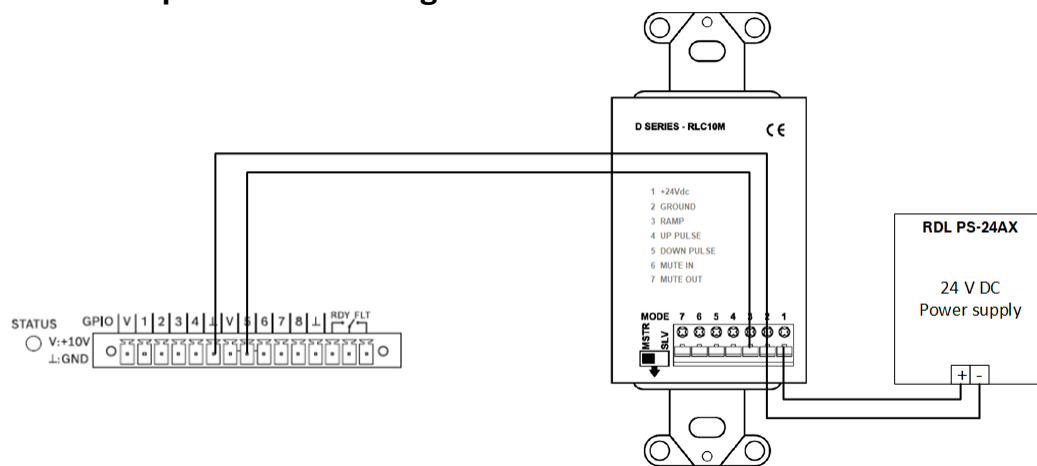
Basic set up − hardware wiring

Image 8: D Series-RLC10M wiring to MXE control port

Wiring table

Dynacord MXE control port pin	RDL D-RLC10M pin
GPI 5	3 RAMP
⊥ (ground)	2 GROUND

RDL PS-24AX	RDL D-RLC10M pin
+	1 +24Vdc
-	2 GROUND

Important hint: the *MODE* switch on the D‑RLC10M rear panel must be set to *MSTR*.

The D‑RLC10M control panel basically offers the connection of multiple D‑RLC10M units in parallel, one configured as master (MSTR) and all others as slaves (SLV). This mode of operation has not been tested with MXE. See RDL D‑RLC10M manual for further details.

Basic set up − software configuration

In SONICUE under Setup>GPIO, the **MXE GPI5 needs to be configured as "GPI Analog"**.
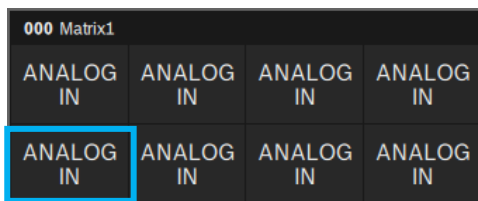

Image 9: MXE GPIO Configuration

Then the MXE *Task Engine* must be programmed. To translate a GPI voltage (0…10 V) to a DSP level value (typically -80…18 dB), the following Task Engine structure with an *Analog Scaler* block can be used:
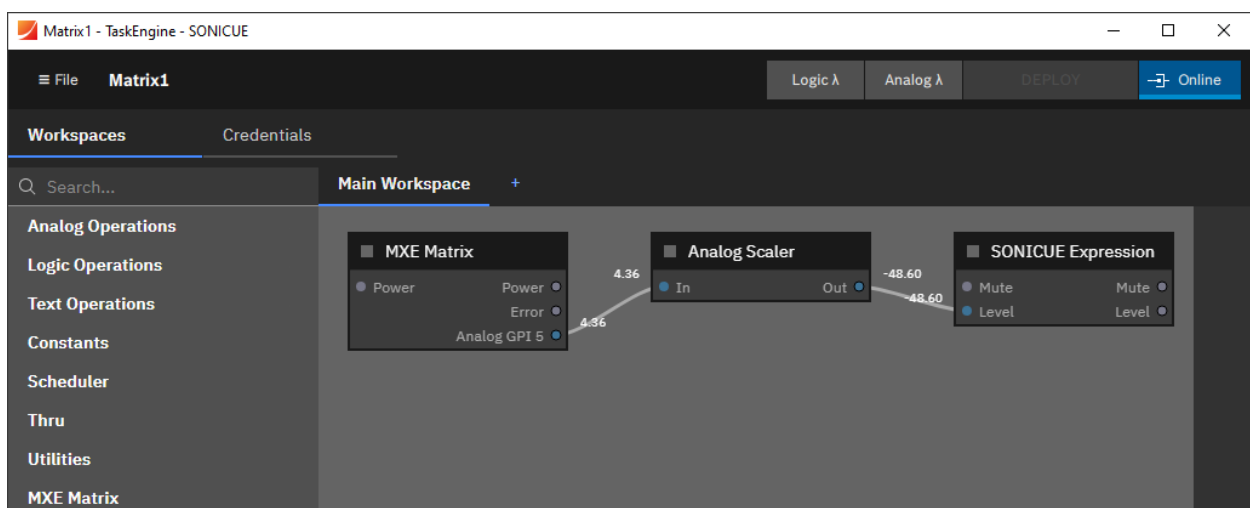

Image 10: MXE Task Engine structure with *Analog Scaler* block to translate a voltage at GPI1 to a level in DSP

See chapter *4. MXE Task Engine with Analog Scaler block* for more configuration details.

3. RDL D Series-RC4RU 4-Channel Remote Control (third party)

Product images

Image 11: D Series-RC4RU variants and rear view (right)

Brief description and application example

The D-Series-RC4RU is an active, analog *SELECT* control panel.

It features four pushbutton controls (*1 / 2 / 3 / 4*) with four corresponding LEDs that act as a radio button group and can be used for controlling MXE DSP parameters − such as selecting an input source or loading a preset − by activating one of four open collector outputs. The status of these open collector outputs, which need to be wired to (up to) four GPIs of the MXE's control panel, is then translated by MXE logic to the desired MXE DSP functions or parameters.

Pushing one of the four pushbutton controls (*1 / 2 / 3 / 4*) will activate the corresponding LED and open collector output. Only one selection can be active at a time (radio button group).

As this is an active electronic design, a separate 24 V DC power supply is required. For testing the RDL PS-24AX power supply (24 Vdc, 500 mA) has been used.
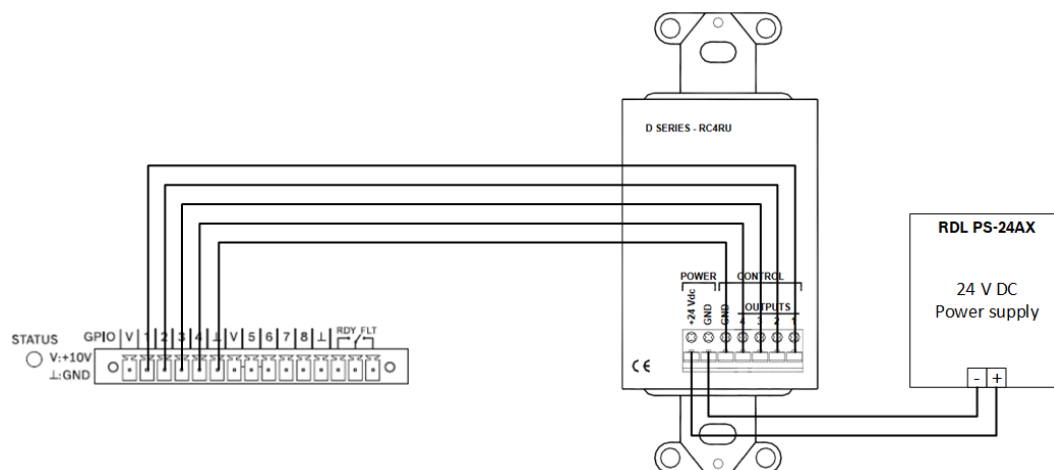
Basic set up − hardware wiring

Image 12: D Series-RC4RU wiring to MXE control port

Wiring table

Dynacord MXE control port pin	RDL D-RC4RU pin
GPI 1	CONTROL OUTPUT 1
GPI 2	CONTROL OUTPUT 2
GPI 3	CONTROL OUTPUT 3
GPI 4	CONTROL OUTPUT 4
⊥ (ground)	CONTROL GND

RDL PS-24AX	RDL D-RC4RU pin
+	POWER +24Vdc
-	POWER GND

Basic set up − software configuration

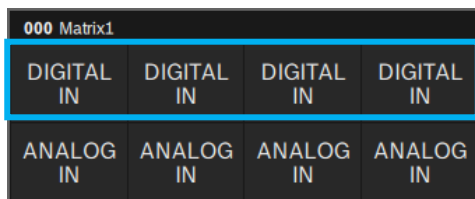In SONICUE under Setup->GPIO, the **MXE GPIs 1-4 need to be configured as "GPI Digital"**.

Image 13: MXE GPIO Configuration

Then the MXE Task Engine must be programmed. To recall four presets (U01…U04) via four GPIs (GPI1-4), the following Task Engine structure with two MXE Matrix blocks (for better overview) can be used:
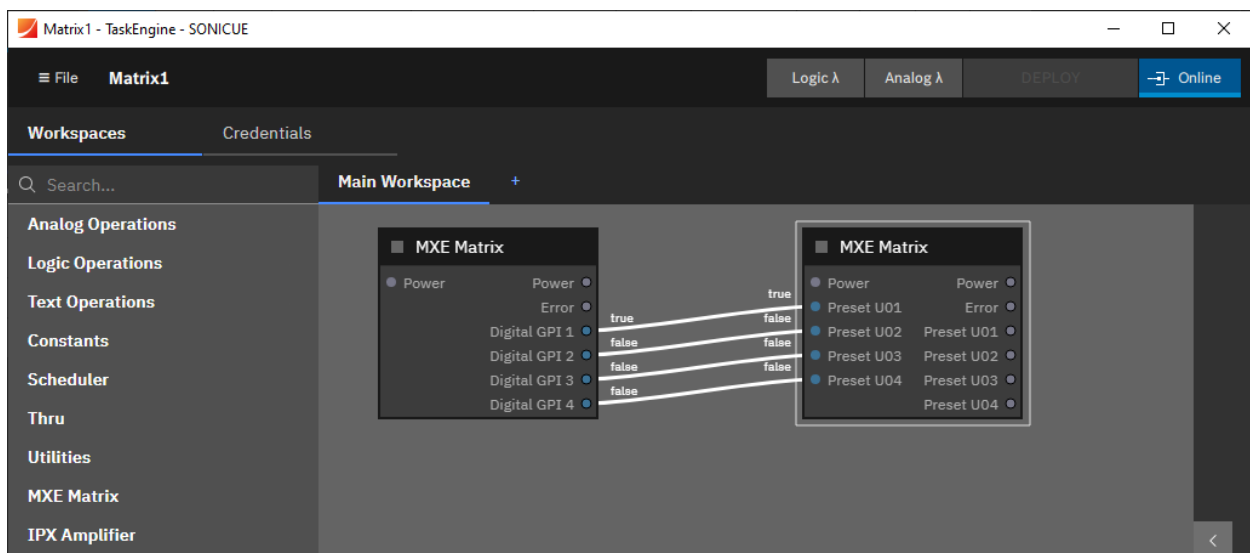

Image 14: MXE Task Engine structure with two *MXE Matrix* blocks (for better overview) to recall presets via GPIs

See chapter *4. MXE Task Engine with Analog Scaler block* as an example for a Task Engine configuration.

4. MXE Task Engine with Analog Scaler block

MXE Task Engine offers an *Analog Scaler* block for converting for example a GPI voltage (0...10 V) to a DSP level value (typically -80...18 dB).

4.1. MXE Task Engine configuration for controlling a DSP Level value via analog GPI

Hint: When online with the MXE Matrix, the Task Engine shows the status of logic or analog values on the connecting lines between blocks (screenshot: true/false or analog value).
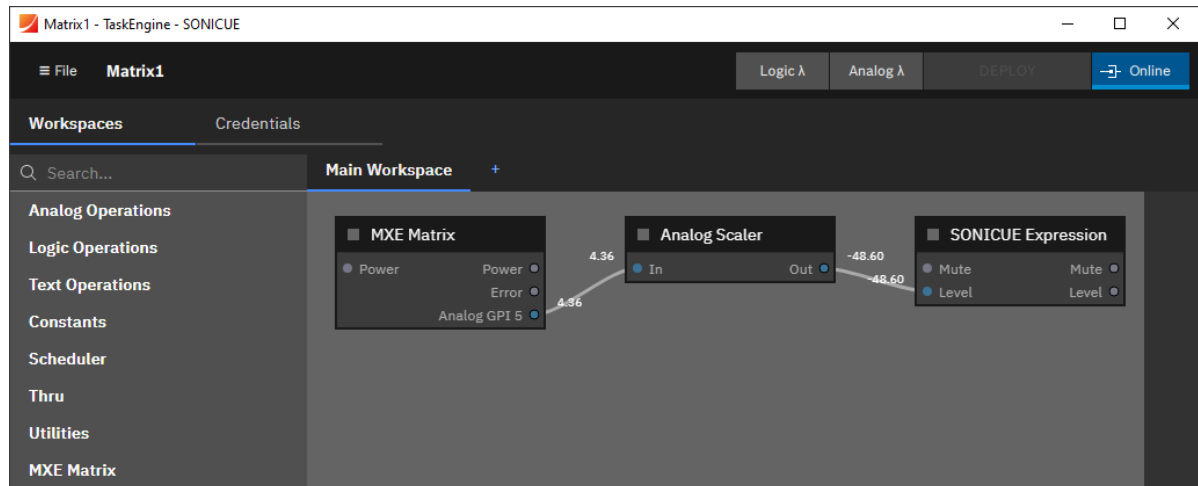
Image 15: MXE Task Engine structure with *Analog Scaler* block for controlling a DSP Level value via analog GPI

4.2. MXE Task Engine *MXE Matrix* block configuration for using a GPI Analog as interface.

The *MXE Matrix* block, added from the *MXE Matrix* menu, can be modified by selecting it, and then clicking the arrow button on the right-hand side of the worksheet.
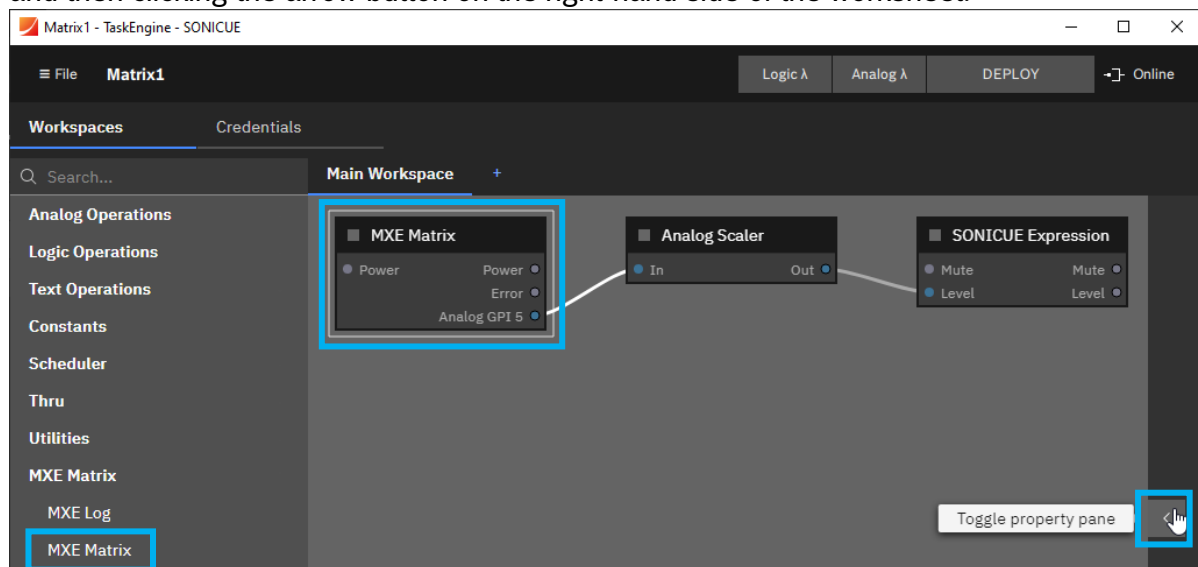
Image 16: MXE Task Engine *MXE Matrix* block, added from the *MXE Matrix* menu

The *Analog GPI 5* connector on the *MXE Matrix* block is configured by selecting *Visible Analog GPI 5* in the drop-down menu.
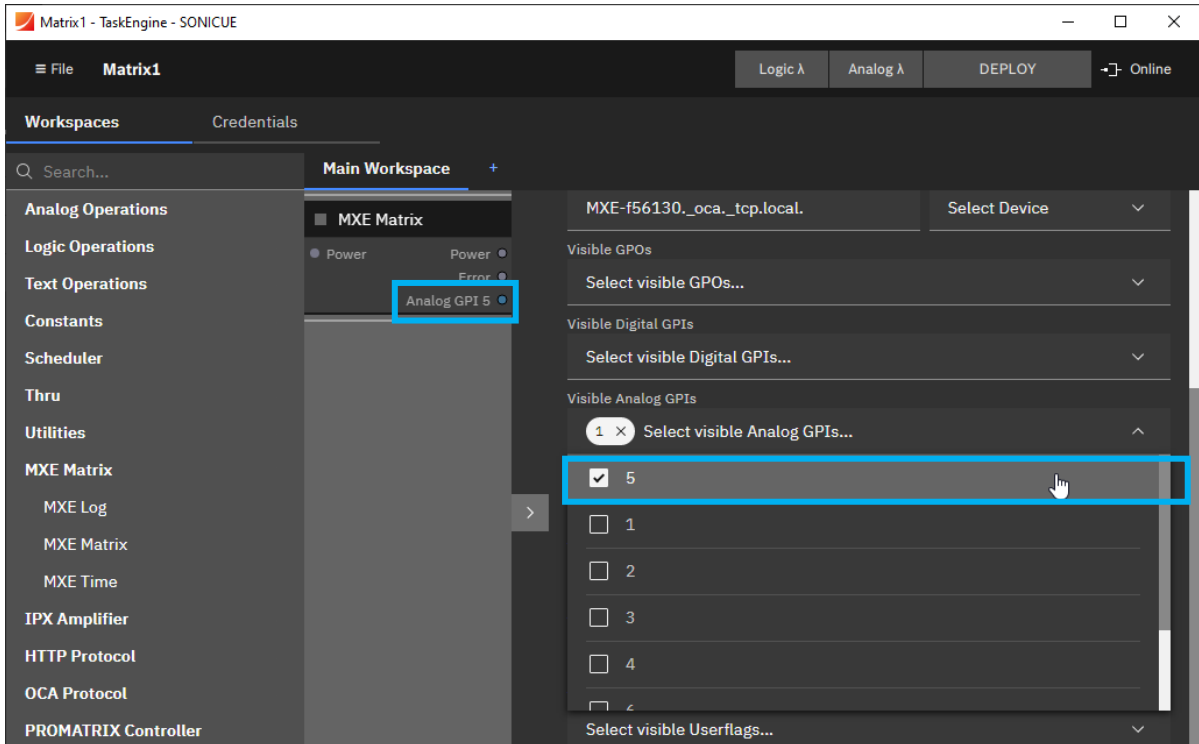

Image 17: MXE Task Engine *MXE Matrix* block configuration with *Visible Analog GPI 5*

It's important to select the *Device* with the *Select Device* drop-down menu (therefore the Device(s) must be visible on network!).
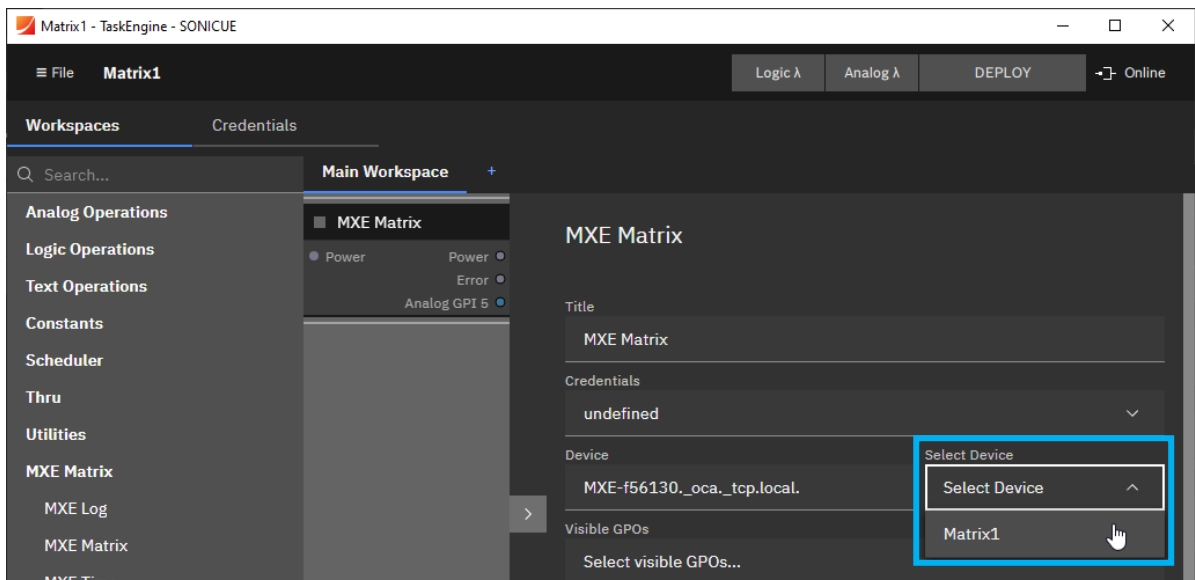

Image 18: MXE Task Engine *MXE Matrix* block selection of *Device*

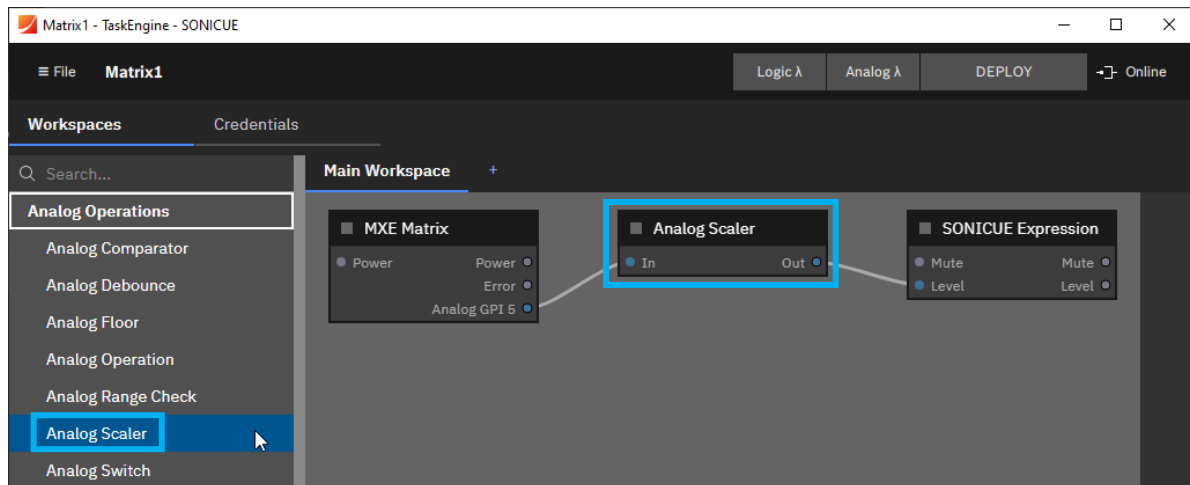## 4.3. MXE Task Engine *Analog Scaler* block added from the *Analog Operations* menu

Image 19: MXE Task Engine *Analog Scaler* block, added from the *Analog Operations* menu

The Analog Scaler block needs to be configured with the following information:

- *Title*   optional, should be edited for better overview
- *In Range Min*   minimum input value (default = 0)
- *In Range Max*   maximum input value (default = 10)
- *Out Range Min*   minimum output value (default = -100)
- *Out Range Max*   maximum output value (default = 18)

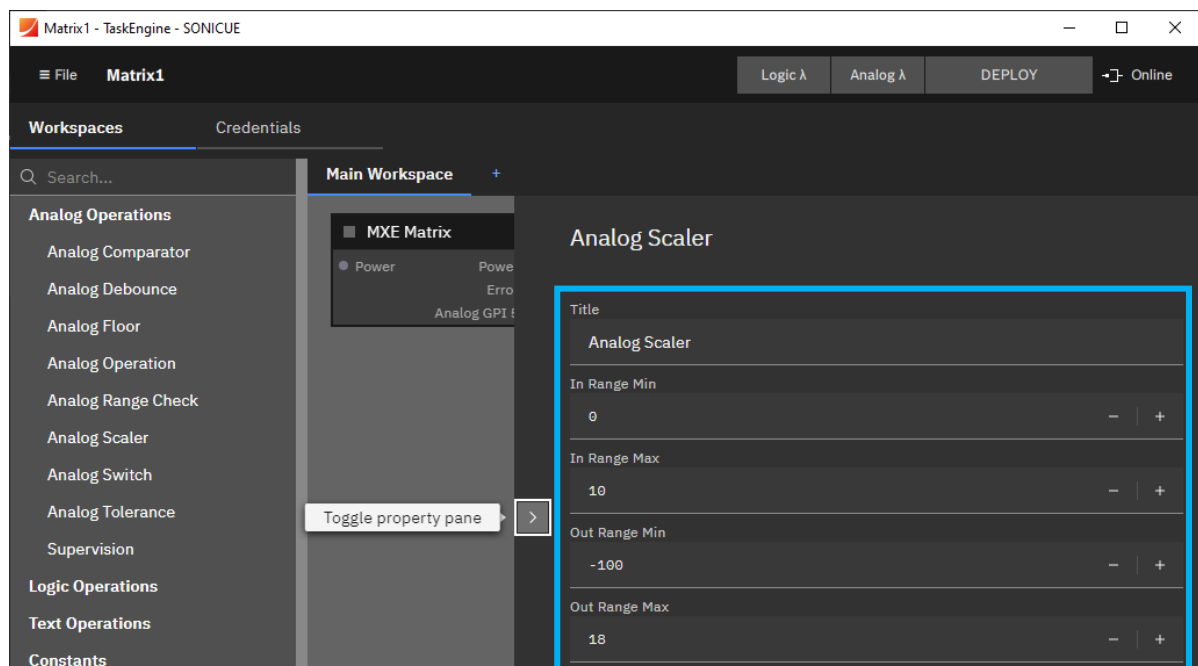In the screenshot example below the *Analog Scaler* with default values is shown.

Image 20: MXE Task Engine *Analog Scaler* block information to be configured

4.4. Adding DSP expressions to an MXE Task Engine configuration

With a DSP flyout open, like the Level flyout in the screenshot below, a DSP expression can be easily added to a Task Engine structure via **drag&drop (+ CTRL key pressed)**.
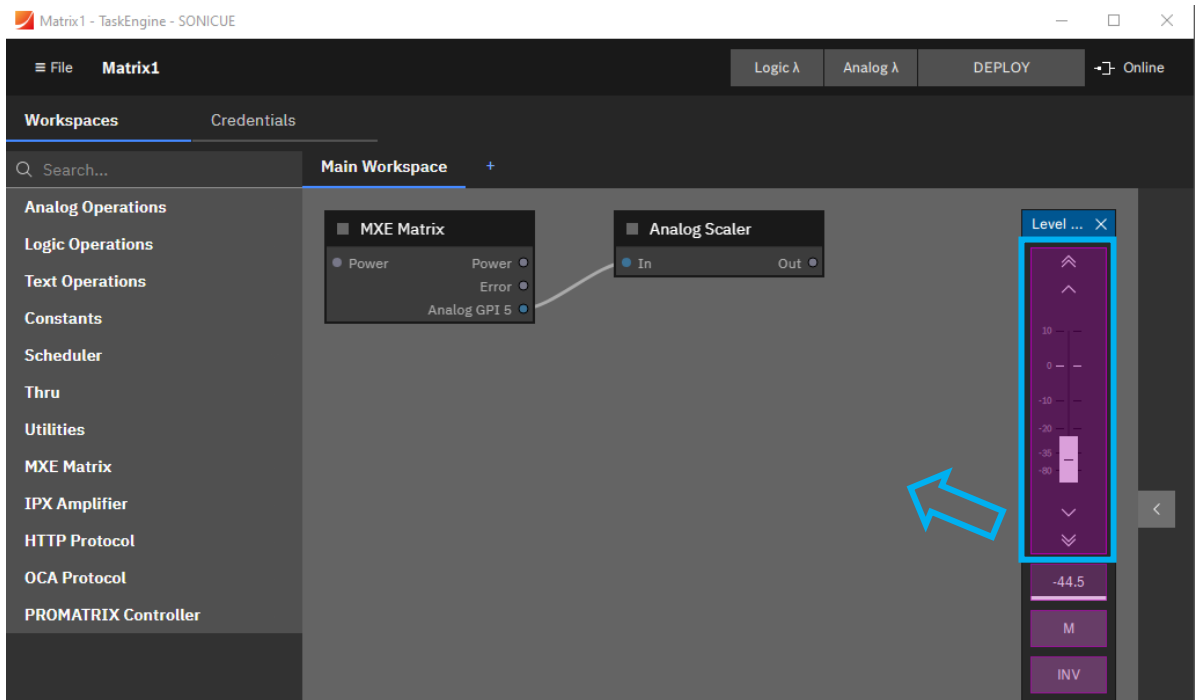

Image 21: MXE Task Engine structure with DSP Level flyout open, structure shown before drag&drop

A *SONICUE Expression* block with Level function has been added to the example Task Engine structure via **drag&drop (+ CTRL key pressed) from the Level flyout**.
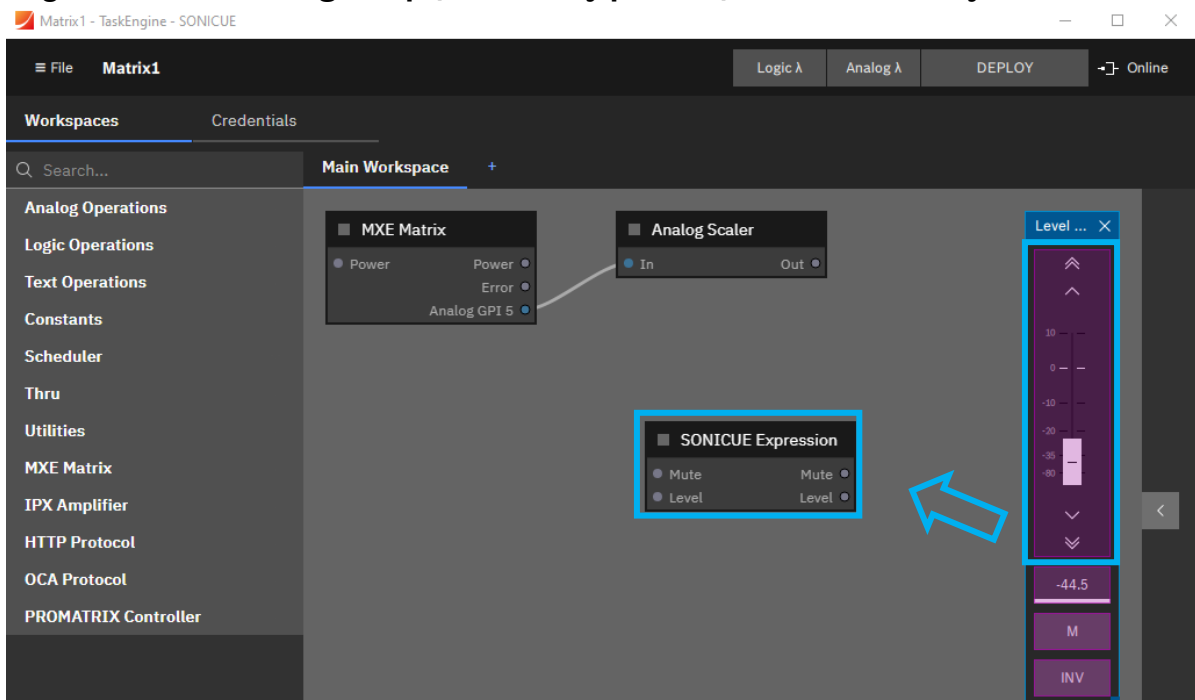

Image 22: MXE Task Engine structure with *SONICUE Expression* block added via drag&drop from a DSP flyout

Finally, the *SONICUE Expression* block (for Level) needs to be connected to the Task Engine structure, for example to the *Out* connector of the *Analog Scaler* block.

With this Task Engine structure, a Level in MXE DSP can be controlled from *Analog GPI 5* of the MXE Matrix.
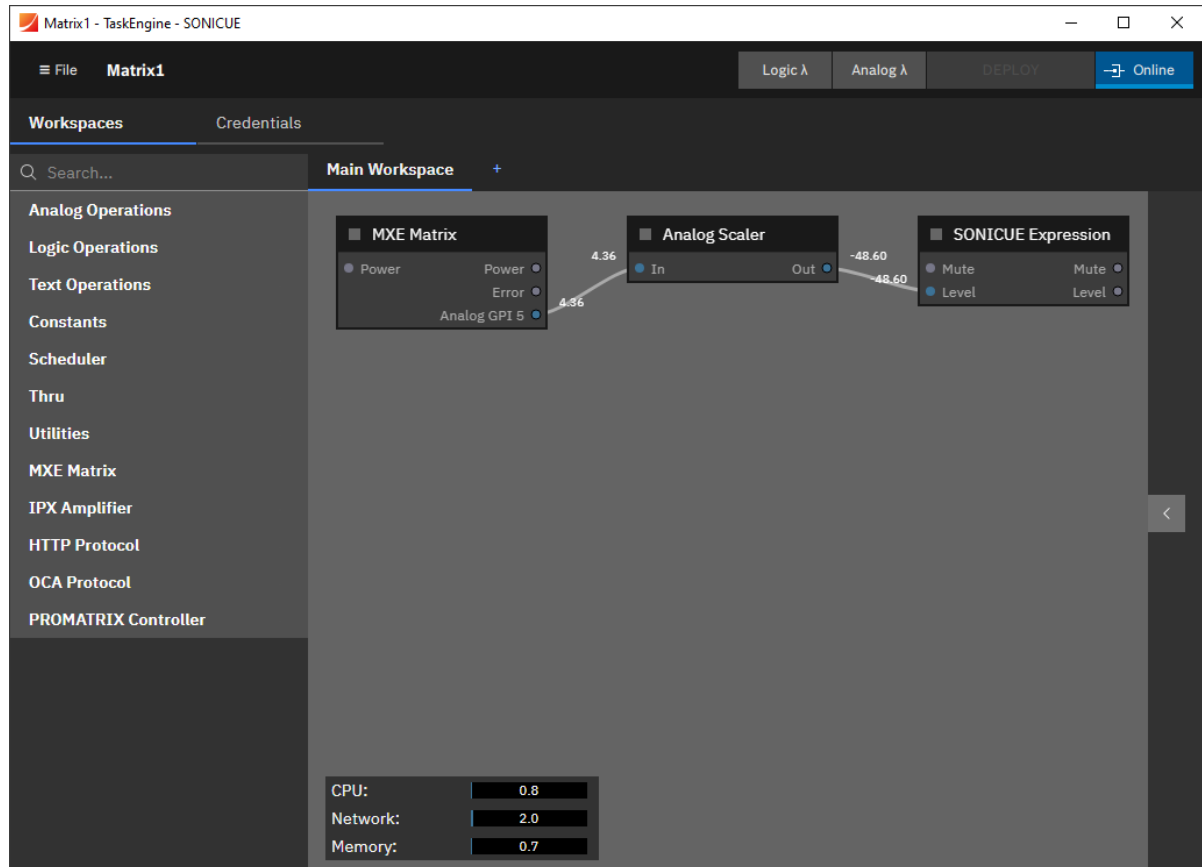

Image 23: MXE Task Engine structure with *SONICUE Expression* block connected to the *Out* connector of the *Analog Scaler* block

Third party product disclaimer:

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