

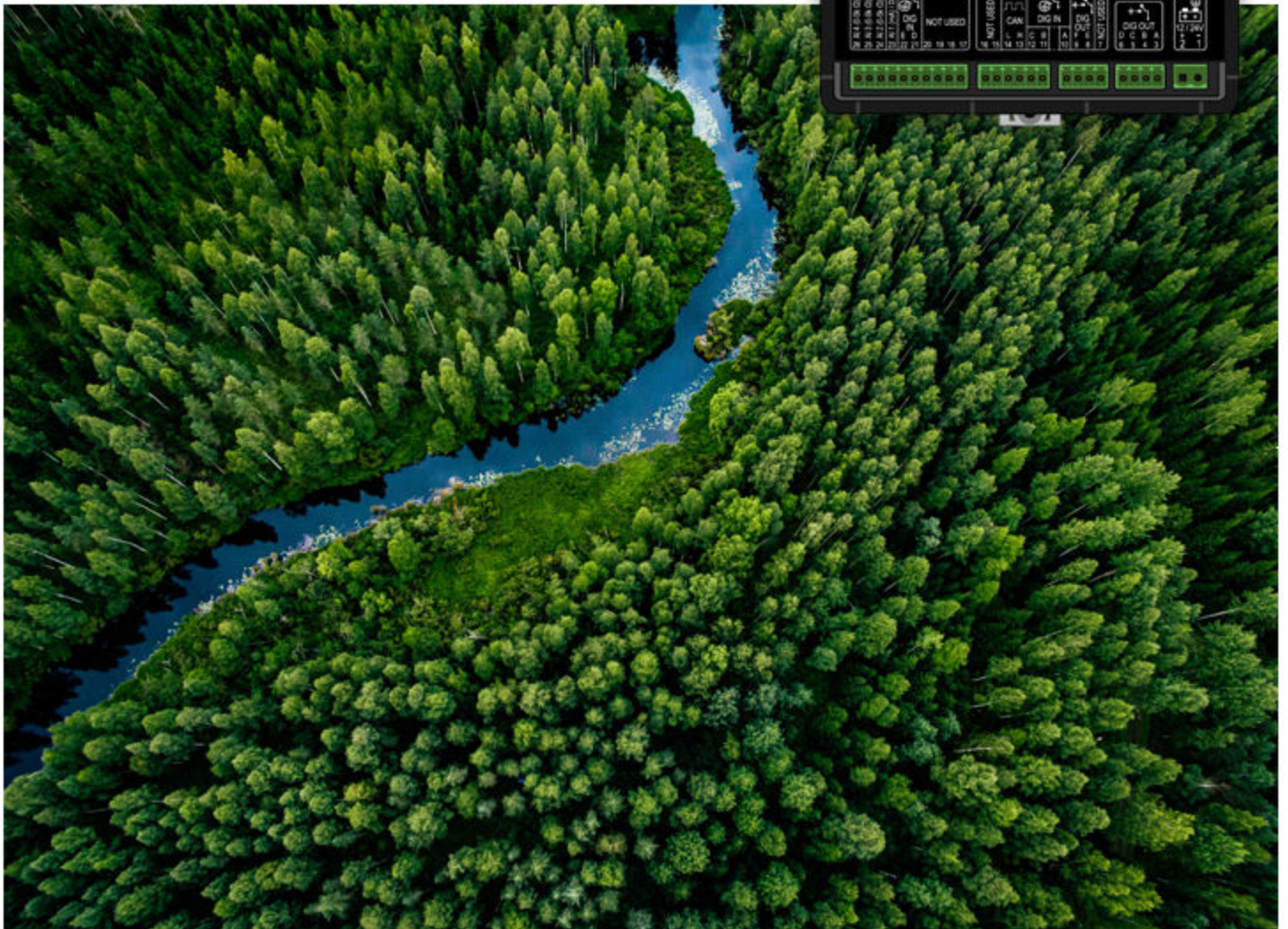
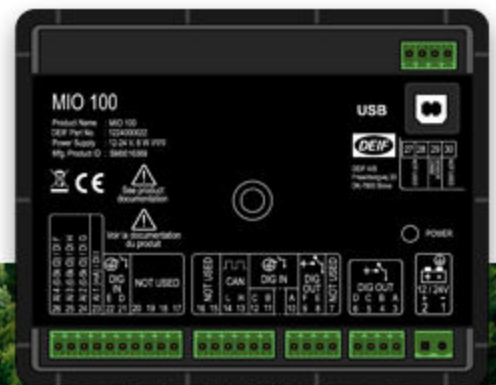
MIO 100

CAN bus-based I/O module

Installation and commissioning guide



Improve
Tomorrow



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1. Introduction

1.1 Warnings, legal information and safety

1.1.1 Warnings and notes

Throughout this document, a number of warnings and notes with helpful user information will be presented. To ensure that these are noticed, they will be highlighted as follows in order to separate them from the general text.

Warnings



DANGER!



This shows dangerous situations.

If the guidelines are not followed, these situations will result in death, serious personal injury, and equipment damage or destruction.



WARNING



This shows potentially dangerous situations.

If the guidelines are not followed, these situations could result in death, serious personal injury, and equipment damage or destruction.



CAUTION



This shows a low level risk situation.

If the guidelines are not followed, these situations could result in minor or moderate injury.

NOTICE



This shows an important notice

Make sure to read this information.

Notes

NOTE Notes provide general information, which will be helpful for the reader to bear in mind.

1.1.2 Legal information and disclaimer

DEIF takes no responsibility for installation or operation of the generator set. If there is any doubt about how to install or operate the engine/generator etc. controlled by the specific extension, the company responsible for the installation or the operation of the extension must be contacted.

NOTICE



Loss of warranty

Only authorised personnel can open the MIO module. Opening the module without authorisation voids the warranty.

Disclaimer

DEIF A/S reserves the right to change any of the contents of this document without prior notice.

The English version of this document always contains the most recent and up-to-date information about the product. DEIF does not take responsibility for the accuracy of translations, and translations might not be updated at the same time as the English document. If there is a discrepancy, the English version prevails.

1.1.3 Safety issues

Installing and operating the MIO module may imply work with dangerous currents and voltages. Therefore, only authorised personnel who understand the risks of live electrical equipment must install the MIO module.



WARNING



Live currents and voltages

Live currents and voltages can cause injury or death. Do not touch live inputs.

1.2 About this document

1.2.1 General purpose

This installation and commissioning guide includes general product and hardware information, mounting instructions, terminal descriptions, I/O descriptions, wiring information, communication setup, and configuration procedures for the MIO 100.

The general purpose of this document is to give the user important information to be used in the installation of the unit.



CAUTION



Read the instructions

Read this document before starting to work with the MIO module and the controller. Failure to do this could result in human injury or damage to the equipment.

1.2.2 Intended users

This installation and commissioning guide is mainly intended for the person responsible for the design and installation. In most cases, this is a panel builder or system designer. Naturally, other users might also find useful information in the document.

1.2.3 Software version

MIO 100

R1.00

2. Installation, mounting and wiring

2.1 Installation

The MIO 100 is delivered in protective packaging to prevent damage during transport.

Upon receipt, verify that the delivered product matches the order and inspect the packaging and product for signs of damage. If any damage is detected, report it immediately to the carrier and your DEIF representative.

If the product is not installed immediately, store it in its original packaging in a clean, dry environment protected from dust, moisture, and mechanical damage.

2.2 Mounting

2.2.1 Mounting the MIO module

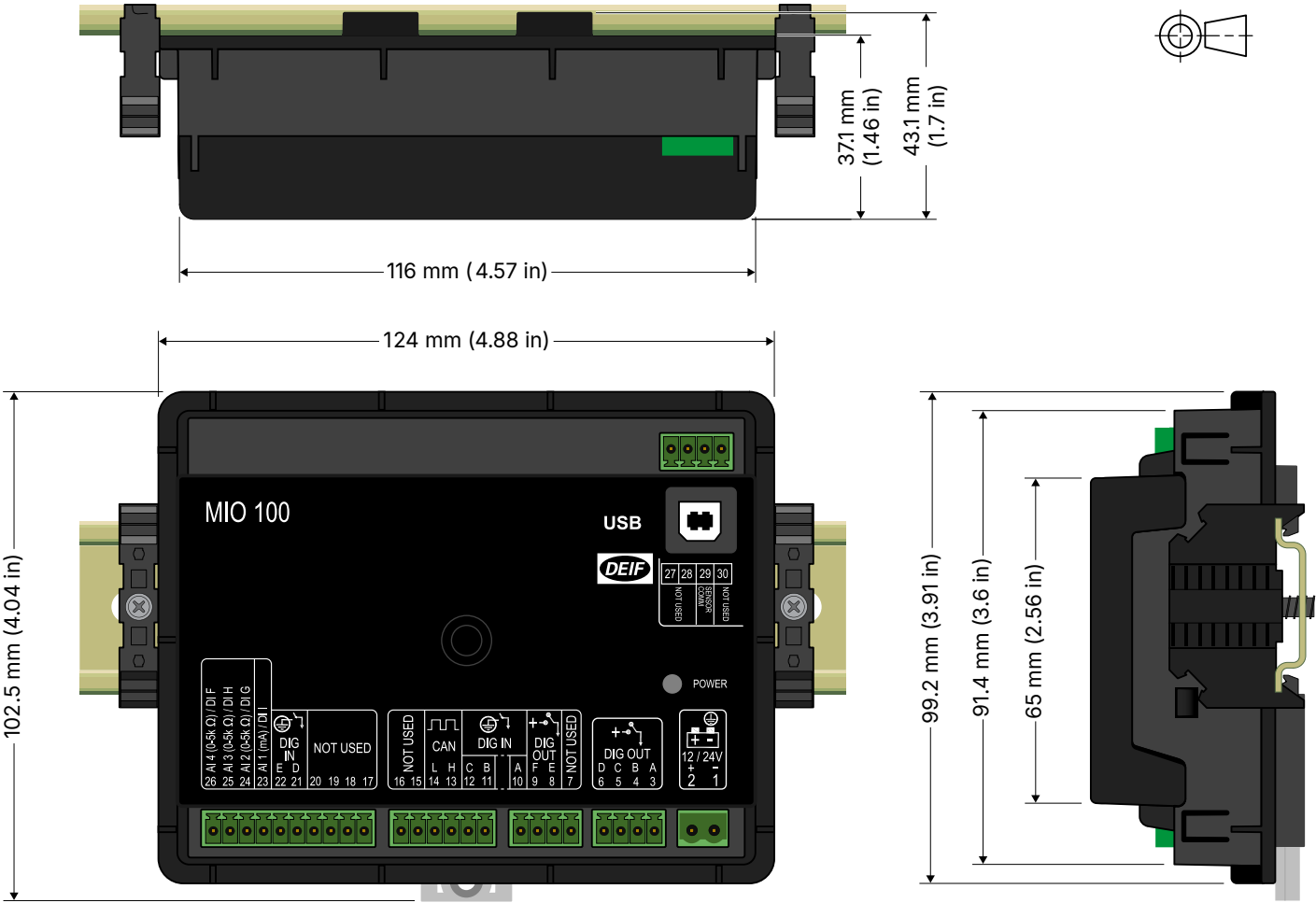
The MIO 100 is designed for installation in a closed cabinet and is mounted on a 35 mm DIN rail (TS35).

Ensure that the installation location complies with the environmental specifications for the product. Allow sufficient space around the module for wiring, inspection, and service.

Mount the module by hooking it onto the DIN rail and pressing it into position until it is securely attached. Verify that the module is firmly mounted before connecting any wiring.

NOTE Mount the product in a location protected from moisture, dust, vibration, and direct sunlight.

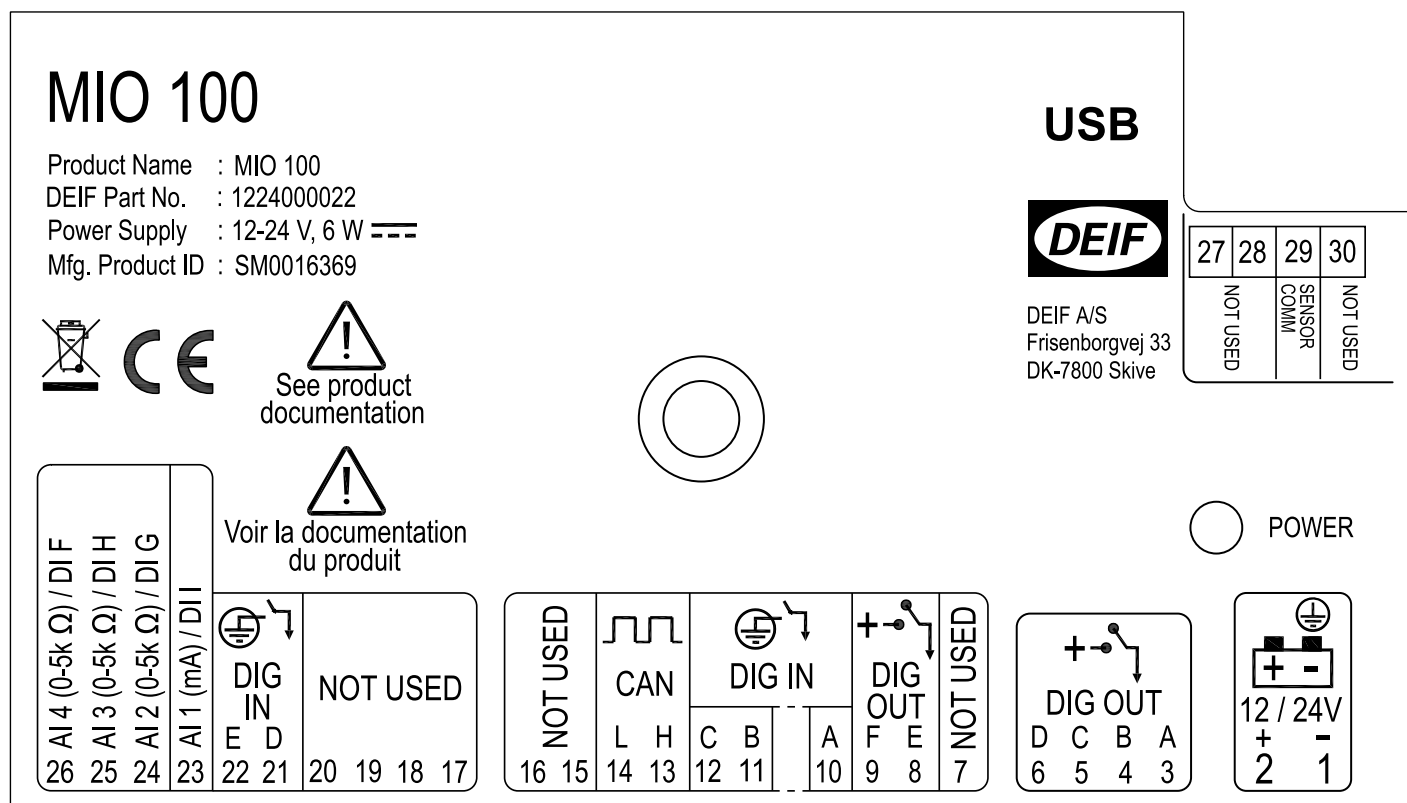
2.2.2 Dimensions



Dimensions	
Dimensions	Length: 124.0 mm (4.88 in)
	Height: 102.5 mm (4.04 in)
	Depth:
	371 mm without DIN rail (1.46 in)
	43.1 mm with DIN rail (1.70 in)
Weight	170 g

2.3 Wiring and terminals

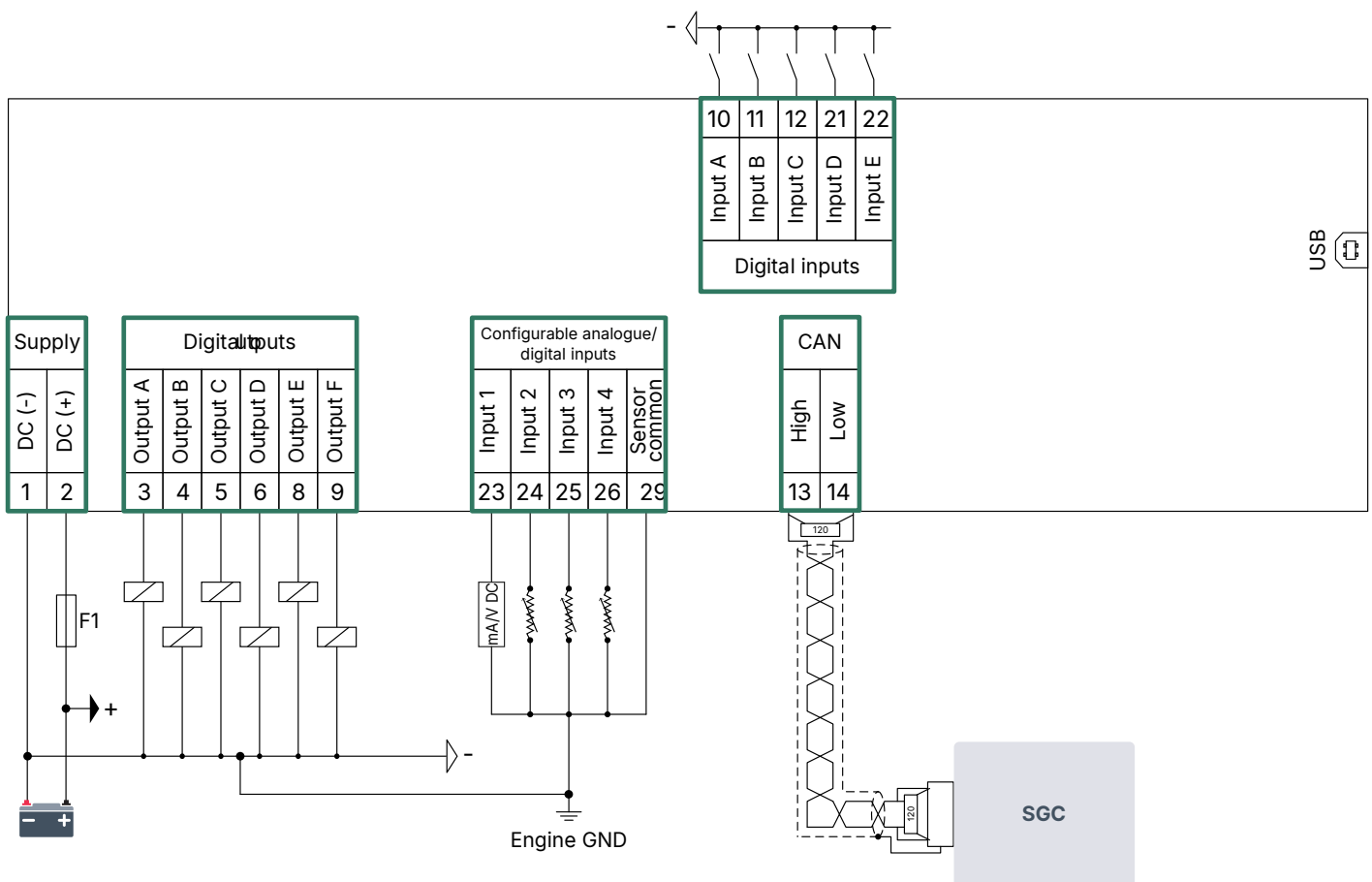
2.3.1 Terminals overview



Terminal	Text	Description
1	GND	Power ground
2	BATT +	Power supply positive (12/24 V DC)
3	DIG OUT A	DC output A
4	DIG OUT B	DC output B
5	DIG OUT C	DC output C
6	DIG OUT D	DC output D
7	Reserved	-
8	DIG OUT E	DC output E
9	DIG OUT F	DC output F
10	DIG IN A	Input from switch A
11	DIG IN B	Input from switch B
12	DIG IN C	Input from switch C
13	CAN H	CAN high
14	CAN L	CAN low
15	Reserved	-
16	Reserved	-
17	Reserved	-
18	Reserved	-
19	Reserved	-

Terminal	Text	Description
20	Reserved	-
21	DIG IN D	Input from switch D
22	DIG IN E	Input from switch E
23	AI 1 (mA) / DI I	Configurable Analogue input or Digital input I
24	AI 2 (0-5k Ω) / DI G	Configurable Resistive Analogue input or Digital input G
25	AI 3 (0-5k Ω) / DI H	Configurable Resistive Analogue input or Digital input H
26	AI 4 (0-5k Ω) / DI F	Configurable Resistive Analogue input or Digital input F
27	Reserved	-
28	Reserved	-
29	SENSOR COMM	Sensor common point
30	Reserved	-

2.3.2 Typical wiring



NOTE The wiring diagram is only an example. Use the wiring diagram for the specific application during installation.

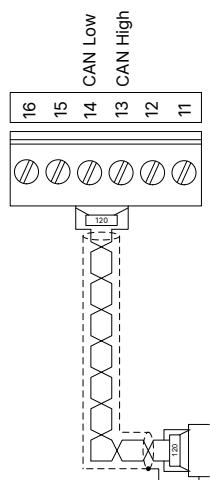
2.3.3 CAN bus

The MIO 100 communicates with compatible SGC controllers through the CAN bus using the J1939 protocol. The CAN connection is provided through terminals 13 (CAN H) and 14 (CAN L). Connect the CAN terminals on the MIO 100 directly to the corresponding CAN terminals on the controller.

The CAN ports on both the MIO 100 and compatible SGC controllers include built-in 120 Ω termination resistors. No external termination resistors are required for a direct point-to-point connection between the MIO 100 and the controller.

Recommended cable: Belden 3105A or equivalent; 24 AWG (0.5 mm²) twisted-pair, shielded cable with a characteristic impedance of 120 Ω , resistance < 40 m Ω /m, and minimum 95 % shield coverage.

NOTE It is possible to connect only one MIO module to a controller.



3. Communication and configuration

3.1 Compatible controllers

The MIO 100 is compatible with the following controller software versions:

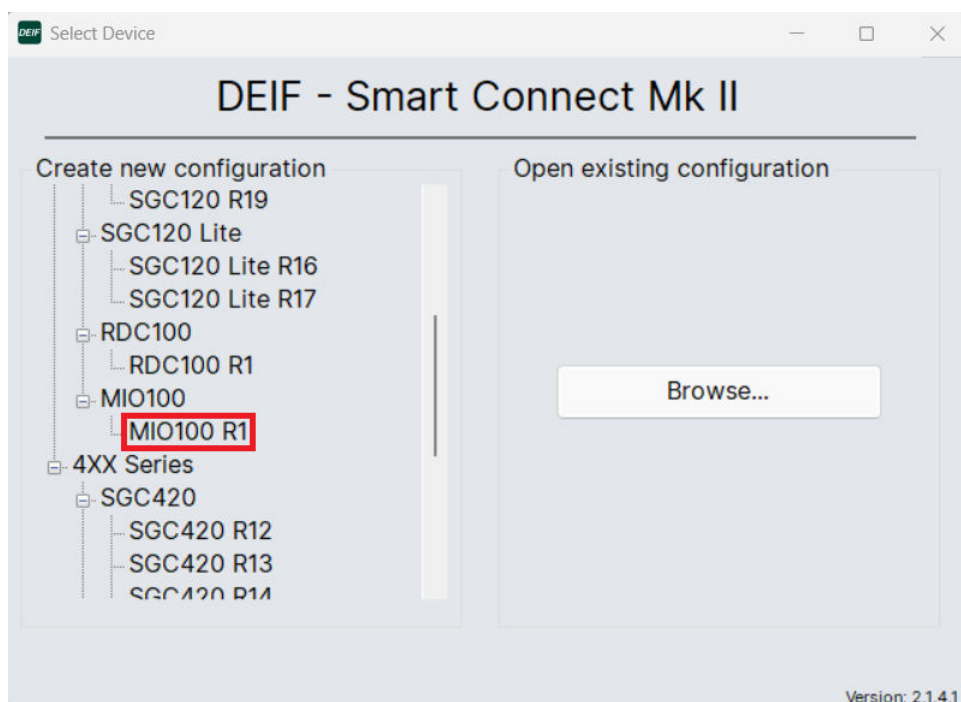
Controller	Minimum software version
SGC 120 Mk II	R19.00
SGC 320 Mk II	R20.00
SGC 420 Mk II	R20.00

3.2 Configuring the MIO 100

Use Smart Connect Mk II to configure the communication settings and analogue inputs of the MIO 100.

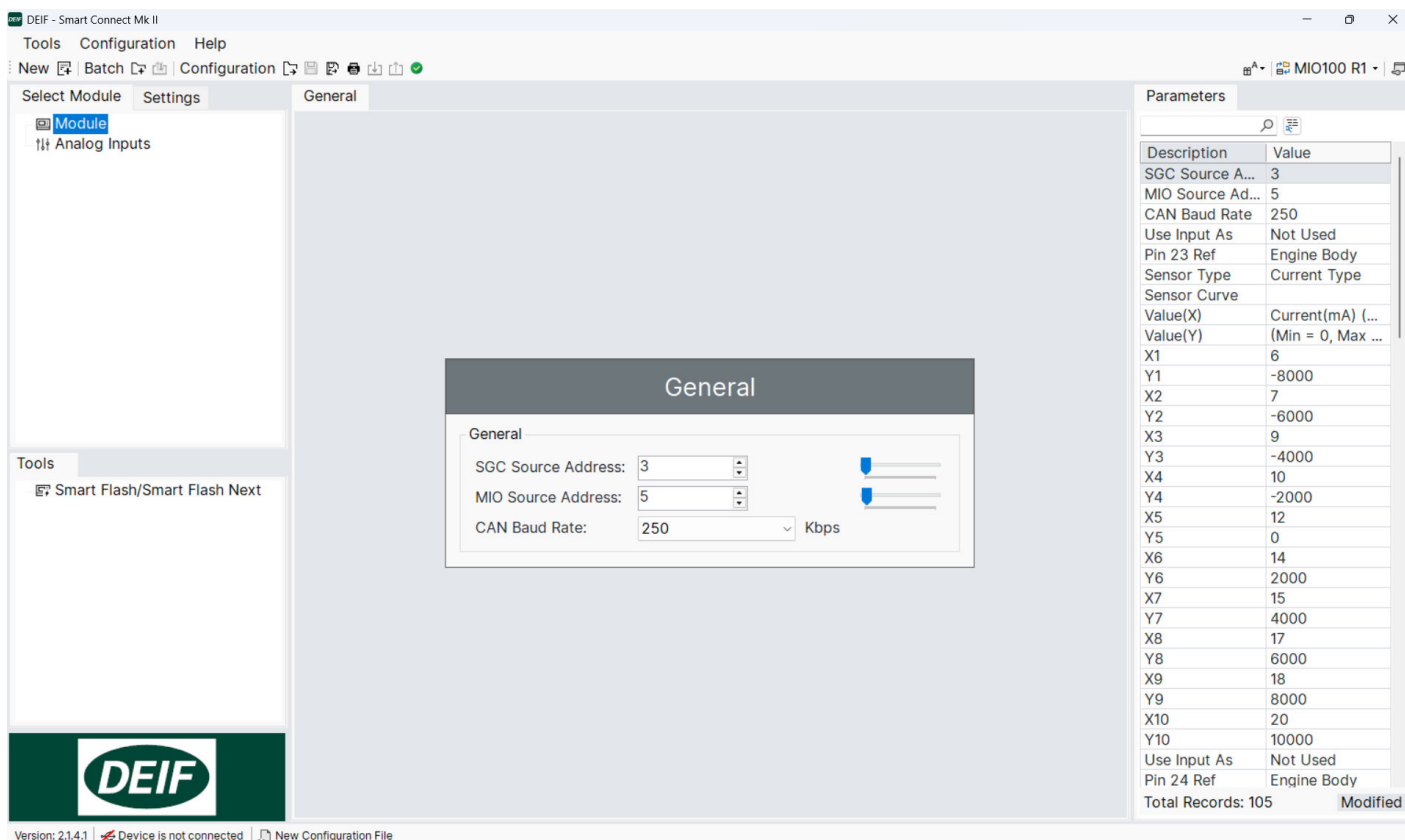
To configure the MIO 100:

1. Open Smart Connect Mk II.
2. Create a new configuration or open an existing configuration.
3. Double-click *MIO100 R1* to create a new configuration.



Configuring communication settings

Configure the communication settings from the *Module* page.



The following parameters are available:

Parameter	Range	Default	Description
SGC Source Address	0 to 253	3	Source address of the connected controller
MIO Source Address	0 to 253	5	Source address of the MIO 100
CAN Baud Rate	250 Kbps 500 Kbps	250 Kbps	Baud rate used for CAN communication

The communication settings must match the settings used by the connected controller.

Configuring analogue inputs

Configure the analogue inputs from the *Analog Inputs* page.

The MIO 100 supports four configurable analogue inputs. The available parameters depend on the selected analogue input and the supported input type.

The screenshot shows the DEIF Smart Connect Mk II configuration interface. The main window is titled 'Analog Input A'. It contains several settings:

- Use Input As:** Not Used (dropdown)
- Pin 23 Ref:** Engine Body (dropdown)
- Sensor Type:** Current Type (dropdown)

Below these settings is a **Calibration Table** section. It includes a 'Sensor Curve' dropdown set to 'Default', and buttons for 'Open' and 'Save As'. The table itself has two rows: 'X' and 'Y', each with 10 columns representing measurement points. The 'X' row values are 6, 7, 9, 10, 12, 14, 15, 17, 18, 20. The 'Y' row values are -800, -600, -400, -200, 0, 2000, 4000, 6000, 8000, 10000.

On the right side of the interface is a **Parameters** list with various system settings like SGC Source, MIO Source, CAN Baud Rate, etc.

Use the calibration table to define the relationship between the electrical input signal and the engineering value required by the application. The calibration table can be used to adapt the input to the characteristics of the connected sensor.

NOTE The available settings vary depending on the selected analogue input and sensor type.

Analogue Input [A to D]

Parameter	Range	Default	Description
Use Input As	Not used Engine coolant temperature Fuel level sensor Lube oil pressure Custom sensor XA [1 to 4]	Not used	Selects the function assigned to the input.
Pin [23 to 26] Ref	Engine Body Battery Negative	Engine Body	Selects the reference point used for the analogue input measurement.
Sensor Type (Analog Input A)	Voltage Type Current Type	Voltage Type	Selects the electrical signal type connected to analogue input.
Sensor Type (Analog Input C)	Resistance Type Voltage Type	Resistance Type	Selects the electrical signal type connected to analogue input.
Calibration Table	X-axis: Current: 4 to 20 mA Voltage: 0 to 5 V Resistance: 0 to 5000 Ω Y-axis: Pressure: 0.0 to 99.0 Bar (Engine) Temperature: -25 to 300 °C Fuel level: 0 to 100 %	-	Configure the x and y values for the 10 measurement points in the calibration table.

Parameter	Range	Default	Description
	Custom value: -3000 to 3000		

Saving the configuration

After completing the configuration:

1. Save the configuration.
2. Verify the communication settings.
3. Transfer the configuration to the MIO 100.

The MIO 100 is now ready to communicate with a compatible controller.



More information

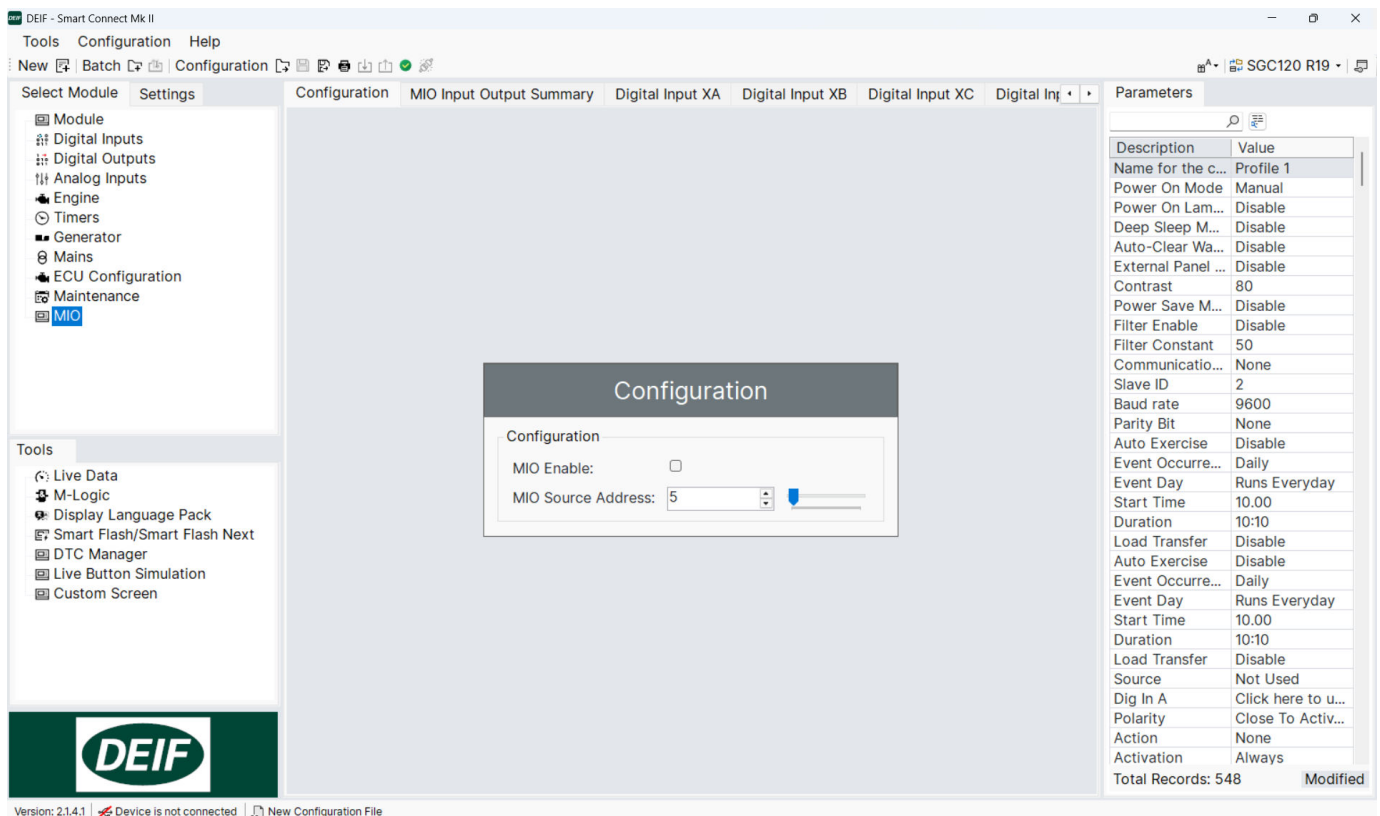
For more information, see the applicable controller User manual.

3.3 Configuring MIO I/O in the controller

After configuring the MIO 100 module, configure the controller to communicate with the module and assign functions to the available MIO inputs and outputs.

Enabling MIO communication

1. Open the controller project in Smart Connect Mk II.
2. Navigate to *MIO > Configuration*.



3. Enable MIO communication.
4. Enter the configured MIO source address.
5. Save the configuration.

The MIO source address must match the source address configured in the MIO 100 module.

Parameter	Range	Default	Description
MIO Enable	Enabled Not enabled	Not enabled	Enables communication with an external MIO module. Select <i>Enabled</i> when an MIO module is connected and should be used by the controller.
MIO Source Address*	0 to 253	5	Specify the J1939 source address of the connected MIO 100.

NOTE * The controller and the MIO 100 must use matching MIO source addresses.

Viewing available MIO I/O

Use the *MIO Input Output Summary* page to view the available MIO resources.

The summary page shows the configured resources:

- Digital inputs
- Analogue inputs
- Digital outputs

The screenshot shows the DEIF Smart Connect Mk II software interface. The main window displays the 'MIO Input Output Summary' page. The interface includes a menu on the left, a central table of MIO resources, and a parameters panel on the right.

MIO Input Output Summary Table:

Submenu	Value
Digital Input XA	Not Used
Digital Input XB	Not Used
Digital Input XC	Not Used
Digital Input XD	Not Used
Digital Input XE	Not Used
Analog Input X1	Not Used
Analog Input X2	Not Used
Analog Input X3	Not Used
Analog Input X4	Not Used
Digital Output XA	Disable
Digital Output XB	Disable
Digital Output XC	Disable
Digital Output XD	Disable
Digital Output XE	Disable
Digital Output XF	Disable

Parameters Panel (Right):

Description	Value
Name for the c...	Profile 1
Power On Mode	Manual
Power On Lam...	Disable
Deep Sleep M...	Disable
Auto-Clear Wa...	Disable
External Panel ...	Disable
Contrast	80
Power Save M...	Disable
Filter Enable	Disable
Filter Constant	50
Communicatio...	None
Slave ID	2
Baud rate	9600
Parity Bit	None
Auto Exercise	Disable
Event Occurre...	Daily
Event Day	Runs Everyday
Start Time	10:00
Duration	10:10
Load Transfer	Disable
Auto Exercise	Disable
Event Occurre...	Daily
Event Day	Runs Everyday
Start Time	10:00
Duration	10:10
Load Transfer	Disable
Source	Not Used
Dig In A	Click here to u...
Polarity	Close To Activ...
Action	None
Activation	Always
Total Records:	548

Configuring digital inputs

Select the required digital input and configure its function.

Digital Input XA

Digital Input XA

Source: Not Used ▼

Dig In XA: [Click here to update Language pack](#)

Polarity: Close To Activate ▼

Action: None ▼

Activation: Always ▼

Activation Delay: 1 ▲ ▼

Sec

The available options depend on the selected controller application.

Digital Input [XA to XE]

Parameter	Range	Default	Description
Source	See the applicable SGC controller User manual.	Not used	Selects the digital input source to monitor. This parameter is available only when the input is configured as a digital input.
Dig In [XA to XE]	Customise the digital input name. Defines the name displayed for the digital input.		
Polarity	Close to Activate Open to Activate	Close to Activate	Selects whether the input is activated by a connection to ground (closed) or by an open circuit.
Action	None Notification Warning Electrical Trip Shutdown	None	Selects the action performed when the digital input is activated.
Activation	Never From Engine Start From Monitoring On Always	Always	Selects when monitoring of the digital input begins.
Activation Delay	0 to 60 s	1 s	Defines the delay before the configured action is performed after the input becomes active.

Configuring analog inputs

Select the required analogue input and configure its application settings. Analogue inputs X1 to X4 can be configured as either an analogue input or a digital input.

If *Use Input As* is set to an analogue function, the sensor configuration is performed in the corresponding *MIO analogue input settings*.

If *Use Input As* is set to *Digital input [XF to XI]*, the input operates as a digital input and the corresponding parameters become available.

Analog Input X1

Analog Input X1

Use Input As:

Source:

Sensor Type:

Dig In XI: [Click here to update Language pack](#)

Polarity:

Action:

Activation:

Activation Delay: Sec 

NOTE Configure the sensor type and sensor calibration in the MIO 100 configuration before configuring the analogue input in the controller.

Analogue Input [X1 to X4]

Parameter	Range	Default	Description
Use Input As	Not used Digital input [XF to XI] Engine coolant temperature Fuel level sensor Lube oil pressure Custom sensor XA [1 to 4]	Not used	Selects the function assigned to the input. If an analogue function is selected, configure the input in the MIO analogue input settings. If <i>Digital input [XF to XI]</i> is selected, the digital input parameters in this menu become available.
Sensor Type (Analog Input X1)	Voltage Type Current Type	Voltage Type	Selects the electrical signal type connected to analogue input X1.
Sensor Type (Analog Input X3)	Resistance Type Voltage Type	Resistance Type	Selects the electrical signal type connected to analogue input X3.
Source	See the applicable SGC controller User manual.	Not used	Selects the digital input source to monitor. This parameter is available only when the input is configured as a digital input.
Dig In [XA to XE]	You can customise the digital input name.		
Polarity	Close to Activate Open to Activate	Close to Activate	Selects whether the input is activated by a connection to ground (closed) or by an open circuit.
Action	None Notification Warning Electrical Trip Shutdown	None	Selects the action performed when the digital input is activated.
Activation	Never From Engine Start From Monitoring On	Always	Selects when monitoring of the digital input begins.

Parameter	Range	Default	Description
	Always		
Activation Delay	0 to 60 s	1 s	Defines the delay before the configured action is performed after the input becomes active.

NOTE Analogue inputs *X1 to X4* correspond to analogue inputs *A to D* in the MIO 100 configuration. Configure the sensor type and calibration for these inputs in the MIO 100 before assigning their function in the controller.

Configuring digital outputs

Select the required digital output and assign the desired output function.

Digital Output XB

Digital Output XB

Source: Disable

Polarity: Energise

The available output functions depend on the controller type and application.

Digital outputs [XA to XF]

Parameter	Range	Default	Description
Source	See the applicable SGC controller User manual.	Disable	Select the source assigned to the digital output.
Polarity	Energise De-energise	Energise	Select whether the output is energised or de-energised when the source is active.

Saving the configuration

After completing the configuration:

1. Save the controller configuration.
2. Transfer the configuration to the controller.
3. Verify that communication with the MIO 100 is established.

The configured MIO inputs and outputs are now available for use by the controller.



More information

For more information, see the applicable SGC controller User manual.

4. Troubleshooting

Problem	Cause	Solution
MIO 100 is not detected by the controller	No power supply to the MIO 100	Verify the supply voltage and wiring.
MIO 100 is not detected by the controller	Incorrect CAN bus wiring	Verify the CAN H and CAN L connections and resistors, and shield connection.
MIO 100 is not detected by the controller	MIO communication not enabled in the controller	Enable MIO communication in Smart Connect Mk II.
MIO 100 is not detected by the controller	Incorrect MIO source address	Verify that the configured MIO source address matches the address configured in the controller.
MIO 100 is not detected by the controller	Unsupported controller software version	Verify that the controller software version supports the MIO 100.
Communication between the controller and the MIO 100 cannot be established	Incorrect CAN baud rate	Verify the CAN baud rate settings in the MIO 100 configuration.
Communication between the controller and the MIO 100 cannot be established	Incorrect source address configuration	Verify that the MIO source address in the controller matches the address configured in the MIO 100.
Analogue input value is incorrect	Incorrect sensor type configuration	Verify the configured sensor type.
Analogue input value is incorrect	Incorrect sensor calibration	Verify the calibration table and scaling.
Analogue input value is incorrect	Incorrect wiring	Verify the sensor wiring and connections.
Digital input does not operate as expected	Incorrect input configuration	Verify the assigned function and polarity settings.
Digital input does not operate as expected	Incorrect wiring	Verify the input wiring.
Digital output does not operate as expected	Incorrect output configuration	Verify the assigned output function.
Digital output does not operate as expected	Incorrect output polarity	Verify the output polarity setting.
Digital output does not operate as expected	Output activation conditions not met	Verify the configured activation conditions.