DEIF

MULTI-LINE 2

Option M16.x
Configurable I/O extension cards, 4 multi-inputs (4-20 mA/0-5 V/Pt100)

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1. Delimitation

1.1 Scope of option M16

This description of option covers the following products:

AGC-4	SW version 4.4x.x or later

ⓘ **INFO**
Option M16 requires MK 2 hardware.

1.1 Scope of option M16

2. General information

2.1 Warnings, legal information and safety

2.1.1 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!
Warnings indicate a potentially dangerous situation, which could result in death, personal injury or damaged equipment, if certain guidelines are not followed.

Notes

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

2.1.2 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 controlled by the Multi-line 2 unit, the company responsible for the installation or the operation of the set must be contacted.

INFO
The Multi-line 2 unit is not to be opened by unauthorised personnel. If opened anyway, the warranty will be lost.

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.

2.1.3 Safety issues

Installing and operating the Multi-line 2 unit may imply work with dangerous currents and voltages. Therefore, the installation should only be carried out by authorised personnel who understand the risks involved in working with live electrical equipment.

DANGER!
Be aware of the hazardous live currents and voltages. Do not touch any AC measurement inputs as this could lead to injury or death.

2.1.4 Electrostatic discharge awareness

Sufficient care must be taken to protect the terminals against static discharges during the installation. Once the unit is installed and connected, these precautions are no longer necessary.

2.1.5 Factory settings

The Multi-line 2 unit is delivered from the factory with default settings. These are not necessarily correct for the engine/generator set. Check all the settings before running the engine/generator set.

3. Description of option

3.1 Option M16.x

Option M16.x is a hardware option and therefore a separate PCB is installed in addition to the standard-installed hardware.

3.1.1 Terminal description, M16.6

Term.	Function	Technical data	Description
90	Multi-input 91	Common	Multi-input configurable: 4-20 mA/0-5 V/Pt100
91	Multi-input 91	Analogue in	
92	Multi-input 93	Common	Multi-input configurable: 4-20 mA/0-5 V/Pt100
93	Multi-input 93	Analogue in	
94	Multi-input 95	Common	Multi-input configurable: 4-20 mA/0-5 V/Pt100
95	Multi-input 95	Analogue in	
96	Multi-input 97	Common	Multi-input configurable: 4-20 mA/0-5 V/Pt100
97	Multi-input 97	Analogue in	

3.1.2 Terminal description, M16.8

Term.	Function	Technical data	Description
126	Multi-input 127	Common	Configurable: 4-20 mA/0-5 V/Pt100
127	Multi-input 127	Analog in	
128	Multi-input 129	Common	Configurable: 4-20 mA/0-5 V/Pt100
129	Multi-input 129	Analog in	
130	Multi-input 131	Common	Configurable: 4-20 mA/0-5 V/Pt100
131	Multi-input 131	Analog in	
132	Multi-input 133	Common	Configurable: 4-20 mA/0-5 V/Pt100
133	Multi-input 133	Analog in	

INFO
Please refer to the Installation Instructions for wiring of the different types of sensors.
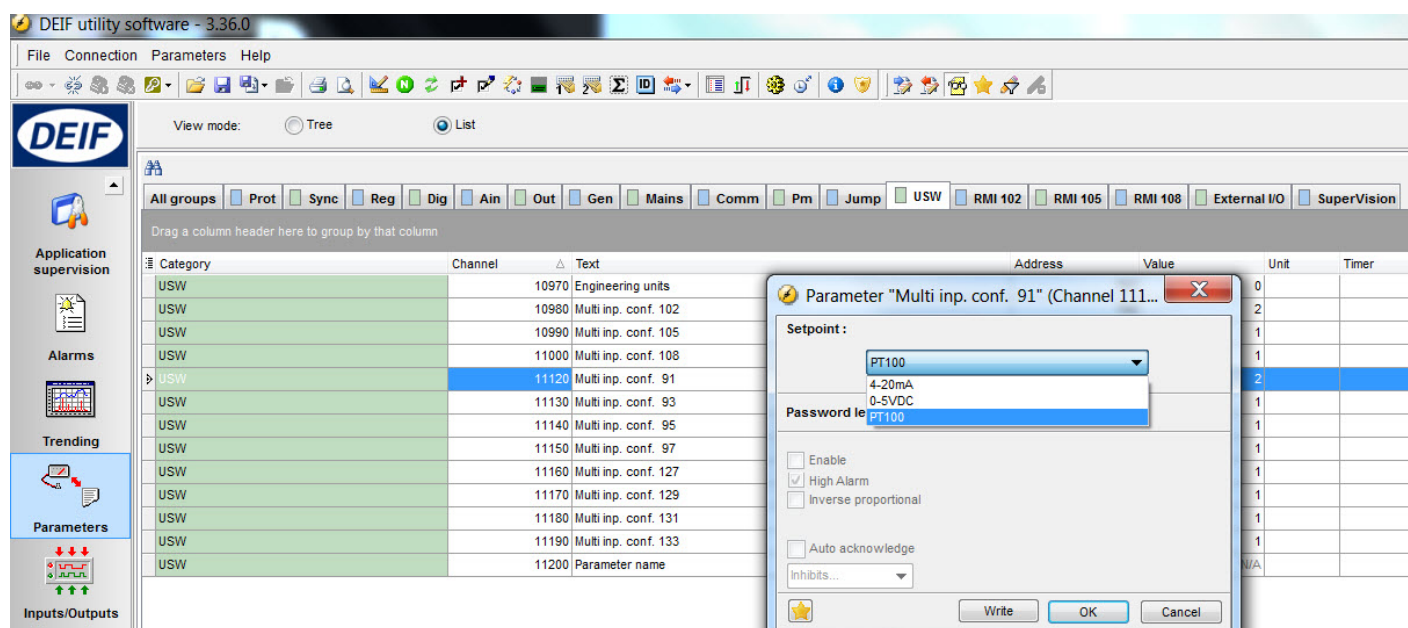
4. Functional description

4.1 Analogue input configuration

Option M16 has four multi-inputs which can be configured to be used as the following three input types:

1. 4-20 mA
2. 0-5V DC
3. Pt100

The configuration of each multi-input can be done by using PC utility software, by pressing the tab USW in the programme. See the picture below.

INFO

The function of the multi-inputs can only be configured in the PC utility software.

For each input, two alarm levels are available. The menu numbers of the alarm settings for each multi-input are controlled by the configured input type as seen in the following tables.

The table below shows related parameter numbers when M16 is placed in slot 6:

Input type	Multi-input 91	Multi-input 93	Multi-input 95	Multi- input 97
4-20 mA/0-5 V/Pt100	4000/4010	4030/4040	4060/4070	4090/4100
Wire break	4020	4050	4080	4110

The table below shows related parameter numbers when M16 is placed in slot 8:

Input type	Multi-input 127	Multi-input 129	Multi-input 131	Multi-input 133
4-20 mA/0-5 V/Pt100	4800/4810	4830/4840	4860/4870	4890/4900
Wirebreak	4820	4850	4880	4910

4.1.1 4-20 mA configuration

In the display, the readings of the 4-20 mA input can be read. The readings are found in the second line of the setup menu or, if configured, in the view menu system.

(i) **INFO**
Refer to the Designer's Reference Handbook regarding the menu system and configuration of user views.

The ML-2 utility software enables you to change the text, scale and unit of the measurement. The text and units can be changed in the "Translations" section of the utility software. The menus used for configuring the scale are 11010-11110. The menus available are option-dependent and can only be accessed from the ML-2 utility software.

If the text of the input is changed, you will see the changed text. This could e.g. be "Oil press. ##bar" instead of "4-20 mA 91.1 ## mA".

4.1.2 Scaling of 4 to 20 mA inputs

The scaling of the analogue inputs is made to ensure that the readout of the inputs is made with a resolution that fits the connected sensor. It is recommended to follow the list below when changing the scaling of the analogue inputs:

1. Set up the multi-input for 4 to 20 mA. This is done in menus 10980-11000 for multi-inputs 102-108 and in menus 11120-11190 for option M15 or M16.
2. Now the scaling parameters are available in menus 11010-11110.
3. Activate the AUTO SCALE enable checkbox when setting up the inputs. This means that the reading remains the same - but decimals are added.
4. Deactivating AUTO SCALE will make the reading smaller by a factor of 10 for each decimal added.
5. Then the alarm parameters for the multi-inputs can be configured.
6. A parameter file (usw file) should always be saved without the AUTO SCALE enabled.

(i) **INFO**
The setup of the multi-inputs and alarm parameters must be done in the above order. If not, the alarm levels will be wrong.

None	Prot	Sync	Reg	Dig	Ain	Out	Gen	Mains	Comm	Pm	Jump	USW	VDO 102	VDO 105	VDO

Drag a column header here to group by that column

Category	Channel	Text	Address	Value
Ain	4000	4-20mA 91.1	256	10
Ain	4010	4-20mA 91.2	257	10
Ain	4020	W. fail ana 91	264	N/A
Ain	4030	4-20mA 93.1	258	10
Ain	4040	4-20mA 93.2	259	10
Ain	4050	W. fail ana 93	265	N/A
Ain	4060	4-20mA 95.1	260	10
Ain	4070	4-20mA 95.2	261	10
Ain	4080	W. fail ana 95	266	N/A
Ain	4090	4-20mA 97.1	262	10
Ain	4100	4-20mA 97.2	263	10
Ain	4110	W. fail ana 97	267	N/A

Setting up decimals

No decimals:

0 to 5 bar oil pressure transducer (4 to 20 mA)

Decimals = 0

Without use of decimals, the set point can only be adjusted in steps of one bar, which gives a very rough range of setting.

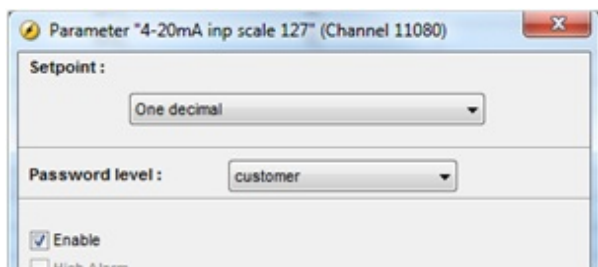The display will show 0 to 5 bar in the measuring range 4 to 20 mA.

```
Analog 127        4mA
Analog 129        4mA
Analog 131        4mA
SETUP  V3   V2   V1   P01
```

One decimal:

0 to 5 bar oil pressure transducer (4 to 20 mA)

Decimals = 1

Auto scale = enable

Decimals = 1, AUTO SCALE = enabled

Decimals = 1, AUTO SCALE = disabled

INFO
Regarding AUTO SCALE: if the number of decimals is changed without enabling the set point, the 4 to 20 mA will be presented as 0.4 to 2.0 mA (0.0 to 0.5 bar). In other words, the "Auto scaling" bit decides where the decimal point is placed.

Setting up the measuring range of the sensor

The measuring range of the multi-input is set up inside the actual alarm:
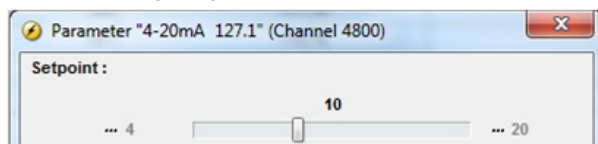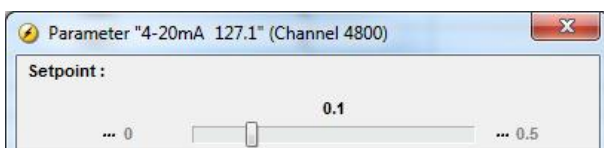

The three dots to the left of the figures is a button. Scale the input as required, for example 0 to 5 bar:
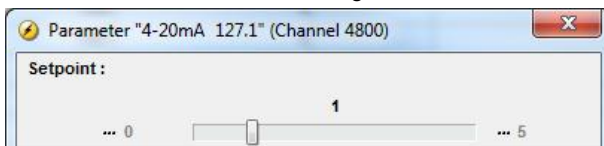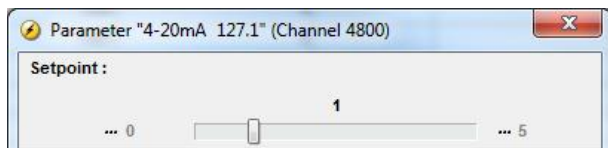

The display will then show 0 at 4 mA.

In order to get the alarm input to work again after changing the "decimal setting", it is necessary to make a readjustment of the alarm:


Change it to match the new selection of decimals.

Therefore, when selecting decimals, the selection of AUTO SCALE depends on whether the alarm inputs are already set up. If they are set up, it is a good idea to select AUTO SCALE. If they are not set up, it is voluntary if AUTO SCALE is selected.

Reload parameters

It is necessary to upload the parameters from the device to the computer after changing the scale (no decimal/one decimal/two decimal) settings. This is in order to refresh the parameter list so the alarm settings present the correct value:
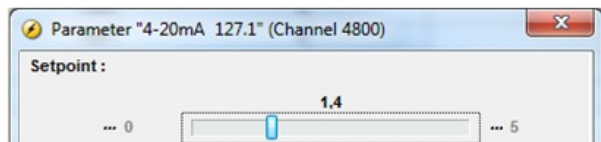
In the example shown above, the value can be adjusted with one decimal. If the parameters were not refreshed, it would still only be possible to adjust the set point without decimals.

Save the parameter file

A parameter file (usw file) should always be saved without the AUTO SCALE enabled.

After having set up the 4 to 20 mA inputs (HW as well as alarms), the parameter file should be uploaded from the device to the PC and then saved. In this way, the AUTO SCALE is deactivated (automatically cleared by the device), and the settings will not be modified again if the parameters are reloaded to the device.

If the file is saved with the AUTO SCALE enabled, the minimum and maximum values of the alarm will be affected (multiplied by 10 or 100) at the next use of the parameter file (under certain conditions).

4.1.3 0-5V DC

0-5V DC input can be used for various sensors which gives a 0-5V DC output. For configuration, use the PC utility software, 0-5V DC can be choosen in parameter 11120-11190 in the USW tab in the PC utility software.

When setting up the alarm level 1 and 2, it is also here the measuring range is set up. Default mesuring range is 0-5 V as shown below:
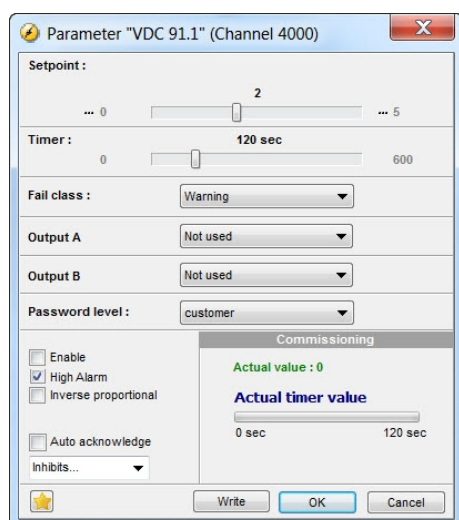
This means that when there is 5 V, the display will show 5 V.

Below is an example where 5 V should be displayed as 20 V:
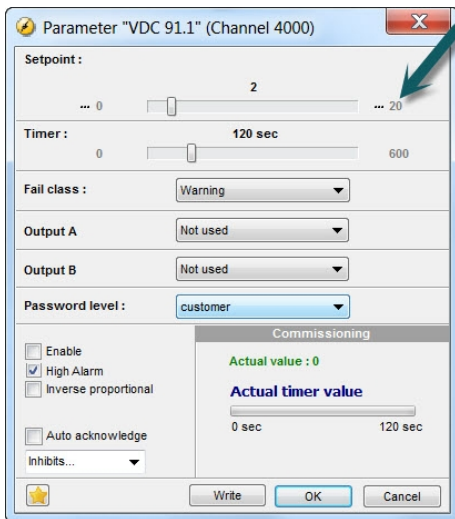
To give the user a better understanding of what the measured value is, it is possible to make an translation of the text in the display, this can be done with the PC utility sofware as in the below example. When pressing F1 in the PC utility software, it will show a guide how to do translation.

4.1.4 Pt100

This input type can be used for a temperature sensor, for example, cooling water temperature. The unit of the measured value can be changed from Celsius to Fahrenheit in the PC utility software in menu 10970 in order to get the desired reading in the display.

Pt100 uses the IEC0.00385 standard to define the relationship between resistance and temperature. It is possible to measure in the range -40 to 250 degrees Celsius, or -49 to 482 degrees Fahrenheit. The screenshot example below shows how it is possible to set up the alarm set point in degrees Fahrenheit.

The display will just show the actual measuring value:

It is also possible to make a translation of the text in the display, so it can be configured to show for example that the measured value is oil temperature. Translations can be done using the PC utility software and pressing F1, then it will show how to do it.

4.2 Differential measurement

The option M16 provides differential measurements between two analogue input values.

The differential measurement functionality relates to the hardware supporting configurable analogue inputs or engine communication.

Menu setup and functional description are described in the Designer's Reference Handbook (DRH) for AGC-4.

4.3 Inverse proportional

In situations where the signal of the input is reversed, the "Inverse proportional" selection can be activated. The selection ensures that the display reading is correct when an "inversed" signal is made.

The diagram shows the characteristics of the "normal" proportional sensor and of the inversed proportional sensor.
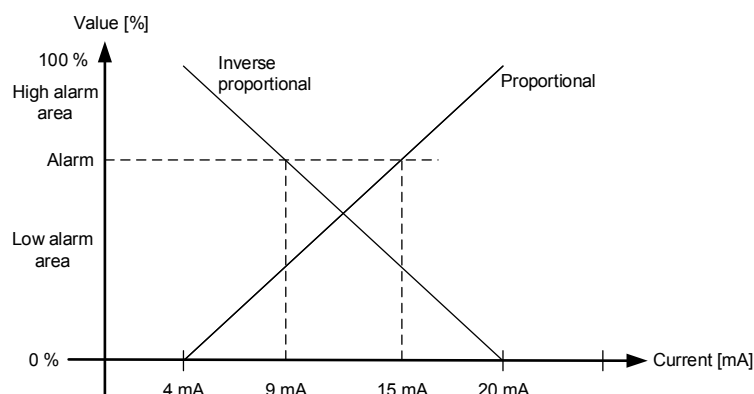
INFO
This function can only be activated by using the PC utility software.

4.4 PC utility software

The PC utility software is a Windows® based software, which can be downloaded from our website www.deif.com. To adjust the inputs via the PC utility software, a computer must be connected to the controller unit. Furthermore, the unit parameters must be uploaded to the computer.

4.5 Wire failure detection

If it is necessary to supervise the sensors/wires connected to the multi-inputs, then it is possible to enable the wire break function for each input. If the measured value on the input is outside the normal dynamic area of the input, it will be detected as if the wire has made a short-circuit or a break. An alarm with a configurable fail class will be activated.

Input	Wire failure area	Normal range	Wire failure area
4-20 mA	< 3 mA	4-20 mA	> 21 mA
0-5V DC	≤ 0V DC	-	N/A
Pt100	< 82.3 ohm	-	> 194.1 ohm

Principle

The illustration below shows that when the wire of the input breaks, the measured value will drop to zero. Then the alarm will occur.