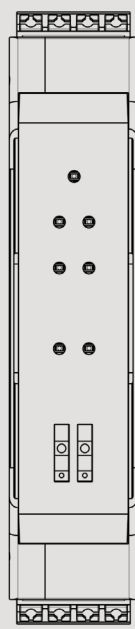
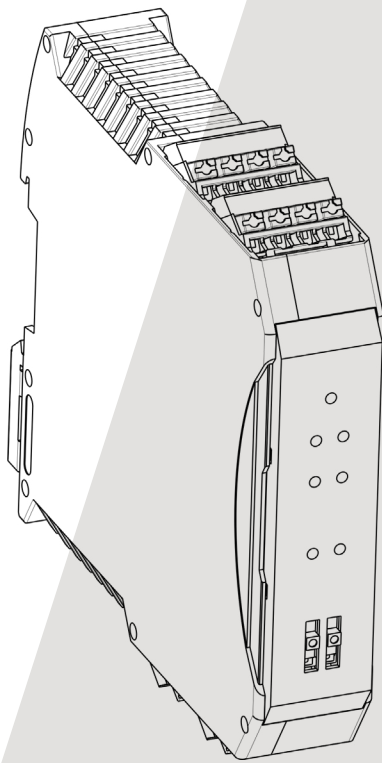




Power



DPM

Digital Potentiometer Module

Installation and maintenance

This manual concerns the DPM which you have just purchased.
We wish to draw your attention to the contents of this maintenance manual.

SAFETY MEASURES

Before using your DPM for the first time, it is important to read the whole of this installation and maintenance manual.
All necessary operations and interventions on this machine must be performed by a qualified technician.
For field applications relative to for instance nonlinear loads, transformers magnetizations or huge load impacts and load shedding, it is highly recommended to contact our technical support service in order to fine tune the factory settings of the voltage regulator. Our technical support service will be pleased to provide any additional information you may require.
The various operations described in this manual are accompanied by recommendations or symbols to alert the user to potential risks of accidents. It is vital that you understand and take notice of the following warning symbols.



Warning symbol for an operation capable of damaging or destroying the machine or surrounding equipment.



Warning symbol for general danger to personnel.



Warning symbol for electrical danger to personnel.



All such operations performed on the DPM should be undertaken by personnel trained in the commissioning, servicing and maintenance of electrical and mechanical components.

WARNING

The DPM can be incorporated in a EC-marked machine.

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0 - TERMS AND DEFINITIONS

Raise: Setpoint increase input
Lower: Setpoint decrease input
S1: 4–20 mA output fault indication associated with Channel 1
S2: 4–20 mA output fault indication associated with Channel 2.
DG1/DG2 : Configurable digital inputs used for module setup and operation

1 - GENERAL INSTRUCTIONS

1.1. - Product Identification

This Digital Potentiometer Module has been designed and manufactured by:
MOTEURS LEROY-SOMER
Boulevard Marcelin LEROY
16000 ANGOULÊME
France
LEROY-SOMER Internal Reference:
40084151

1.2. - General Description

This manual provides installation, operation, configuration, and maintenance instructions for the Digital Potentiometer Module. The purpose of this module is to generate an adjustable analog signal from a digital command source, such as a PLC, microcontroller, or software application. The module is capable of generating the two most common industrial analog signal standards:
- 0–10 V voltage output
- 4–20 mA current output
These signals are typically used as reference signals for voltage regulator control systems.

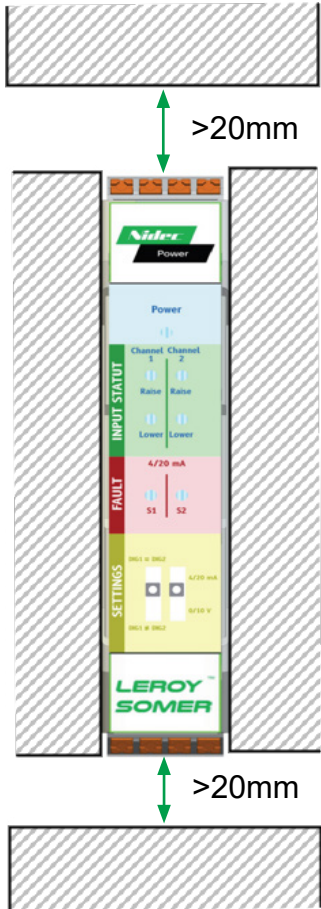
The module consists of the following functional elements:
- A set of connection terminals,
- A Power LED indicating that the module is supplied with the required operating voltage.
- Two status LEDs, S1 (Output 1) and S2 (Output2), indicating a fault condition (open current loop) when operating in 4-20 mA mode.
- Two configuration switches: one that selects whether Channel 1 and Channel 2 operate synchronously or

independently, while the other selects the analog output type (0-10 V or 4-20 mA).



This module is intended for installation inside a terminal box or a control and power electrical cabinet that provides, at a minimum, the level of protection and safety required by the regulations and standards applicable at the installation site.

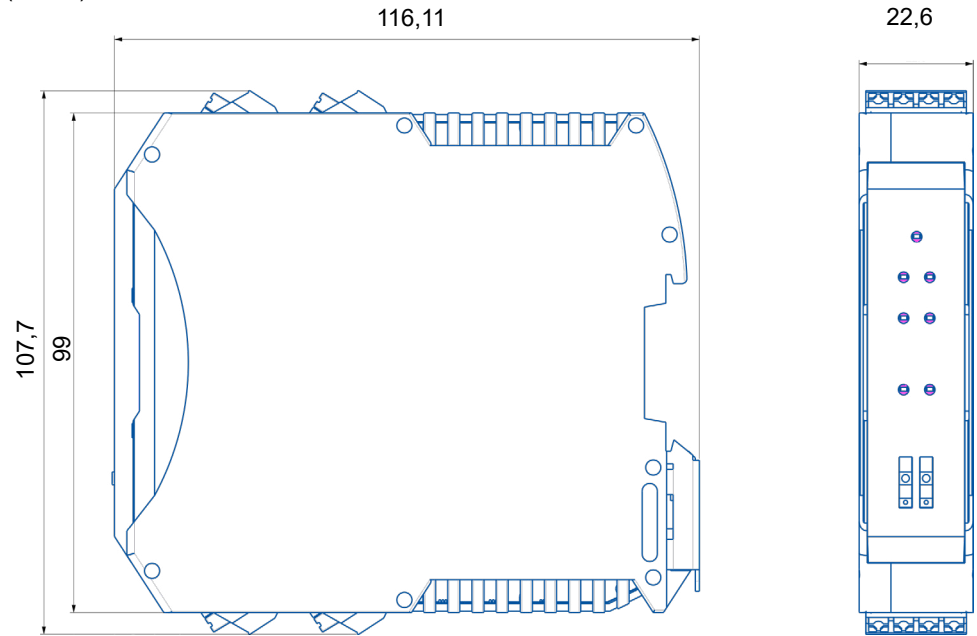
The module is naturally air-cooled and must therefore be installed in accordance with the minimum clearance distances shown below (see following page):



1.3. - Technical Specifications

- **Power Supply:** 24VDC
 - **Digital Inputs:** 0 / 1
 - **Analog Voltage Outputs:** 0 - 10VDC
 - **Analog Current Outputs:** 4 - 20 mA
 - **No-load Current Consumption:** 30mA
 - **Maximum Current Consumption:** 78mA
 - **Installation Environment:** Installed in an electrical cabinet or in the alternator terminal box
- Operating Conditions: ambient temperature between -40°C and +65°C, with a relative humidity below 93%, non-condensing.
- Storage Conditions: ambient temperature between -55°C and +85°C, with a relative humidity below 95%, non-condensing.
- **Weight :** 150g

• Dimensions (in mm)



This module shall be mechanically mounted on a standard 35 mm DIN rail, either inside the terminal box or within an electrical cabinet.

1.4. - General Safety Precautions and Instructions

It is essential to follow the power wiring diagrams provided in this manual.

The Digital Potentiometer Module operates with analog signals (0–10 VDC and 4–20 mA) which may be associated with hazardous electrical voltages.

Before carrying out any work (wiring, inspection, or maintenance):

- Always disconnect the power supply.
- Verify the absence of voltage using an appropriate measuring device.
- If a 4–20 mA output is not used, it must be short-circuited or connected to an appropriate load to prevent an open-loop condition.
- Ensure proper Protective Earth (PE) grounding is provided to minimize the risk of electric shock.

The analog outputs may be used to adjust the voltage regulator setpoint. The Digital Potentiometer Module is intended to be incorporated into an electrical installation or machine and shall under no circumstances be considered a safety device. It is therefore the responsibility of the machine manufacturer, installation designer, or end user to ensure compliance with all applicable standards and regulations, and to provide the necessary protective measures to safeguard personnel and equipment (in particular against direct contact with connectors while the regulator is in operation).

In the event of non-compliance with these instructions, MOTEURS LEROY-SOMER shall not be held liable for any consequences whatsoever.

The various operations described in this manual are accompanied by recommendations and safety symbols intended to alert the user to potential hazards. All safety instructions and warnings provided with this equipment must be carefully read, understood, and strictly followed.

- This symbol indicates warnings in this manual relating to the improper use of the Digital Potentiometer Module and to electrical hazards that may result in injury to personnel, damage to equipment, or fire.



- This symbol indicates a safety instruction warning of an electrical hazard to personnel.



1.5. - General Information

The Digital Potentiometer Module may, during operation, contain exposed live parts as well as hot surfaces. The unjustified removal of protective covers, improper use, incorrect installation, or unsuitable operation may result in serious risks to persons and property. For additional information, refer to the relevant documentation. All work related to transportation, installation, commissioning, operation, and maintenance must be carried out by qualified and authorized personnel (see IEC 364, CENELEC HD 384, or DIN VDE 0100, as well as applicable national installation and accident prevention regulations). For the purpose of these fundamental safety instructions, qualified personnel are persons who are experienced in the installation, assembly, commissioning, and operation of the product and who possess the appropriate qualifications for the tasks to be performed.

1.6. - Intended Use

The Digital Potentiometer Module is a component intended for integration into electrical installations or machinery. When incorporated into a machine, commissioning is prohibited until the conformity of the machine with the requirements of Directive 2006/42/EC (Machinery Directive) has been verified. Compliance with EN 60204 is mandatory, particularly regarding the requirement that electrical actuators, including voltage regulators and this module, shall not be considered as switching or isolation devices. Commissioning is permitted only when the requirements of the Electromagnetic Compatibility Directive (EMC 2014/30/EU) are met. The Digital Potentiometer Module complies with the requirements of the Low Voltage Directive 2014/35/EU. The harmonized standards of the DIN VDE 0160 series, together with VDE 0660 Part 500 and EN 60146 / VDE 0558, are applicable. The technical specifications and all instructions relating to connection conditions provided on the nameplate and in the accompanying documentation must be strictly observed.

1.7. - Transportation and Storage

The requirements relating to transportation, storage, and proper handling of the equipment shall be strictly observed. The climatic conditions specified in this manual must be respected at all times.

1.8. - Installation

The installation and cooling of the equipment must be carried out in accordance with the instructions provided in the product documentation. The Digital Potentiometer

Module must be protected against excessive mechanical stress. In particular, no deformation of parts and no reduction of electrical insulation clearances shall occur during transportation, handling, or installation. Contact with electronic components and electrical contact points should be avoided. The Digital Potentiometer Module contains components that are sensitive to electrostatic discharge (ESD) and may be damaged by improper handling. Electrical components must not be mechanically damaged or destroyed, as this may result in equipment malfunction and could create a risk of personal injury or electric shock when the equipment is energized. If there is any doubt regarding the condition or suitability of the product, please contact Technical Support before installation or commissioning.

1.9. - Electrical Connections

When work is carried out on the energized Digital Potentiometer Module, all applicable national accident prevention regulations must be observed. The electrical installation must be performed in accordance with all applicable regulations and standards (for example, conductor sizing, fuse protection, and protective earth connection requirements). More detailed information is provided in this manual.

Instructions relating to electromagnetic compatibility (EMC), including cable shielding, grounding, filtering requirements, and proper routing of cables and conductors, are also provided in this manual. These instructions must be followed in all cases, even when the Digital Potentiometer Module bears the CE marking. Compliance with the electromagnetic compatibility limits established by applicable legislation remains the responsibility of the manufacturer of the installation or machine.

1.10. - Operation

Installations incorporating a Digital Potentiometer Module must be equipped with any additional protection and monitoring devices required by the applicable safety regulations, such as technical equipment safety legislation, accident prevention regulations, and other relevant standards. After the Digital Potentiometer Module has been switched off, live parts and energized power connections must not be touched immediately, as capacitors may still retain a hazardous electrical charge. During operation, all covers, guards, and enclosure doors must remain closed.

1.11. - Servicing and Maintenance

The manufacturer's documentation must be carefully followed. Our Technical Support Department is available to provide any additional information or assistance you may require. **This manual must be passed on to the end user.**

2 - INSTALLATION AND WIRING INSTRUCTIONS

2.1. - Clearance Requirements Around the Module

Dimensions: refer to Section 1.3, Technical Specifications. Adequate free space must be provided around the module to ensure proper airflow and effective cooling.



When the Digital Potentiometer Module is installed in an electrical cabinet, it shall be positioned so that air can circulate freely around the ventilation openings. For optimum cooling performance, vertical mounting on a DIN rail is recommended.

A ventilation, cooling, or heating system shall be provided, as necessary, to ensure that the module operates within the environmental limits specified above.

Note: If you intend to install the module under conditions that do not meet the requirements described above, please contact Technical Support.

2.2. - Installation Warning Symbols

Refer to Section 1.4, General Safety Precautions and Instructions.

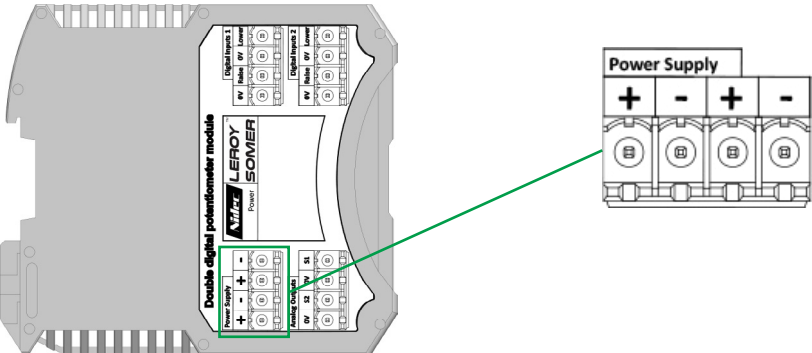


Do not disconnect any wiring or modify the electrical connections while the alternator is energized. Failure to observe this instruction may result in electric shock and/or damage to the module and the alternator voltage regulator.

2.3. - Connections

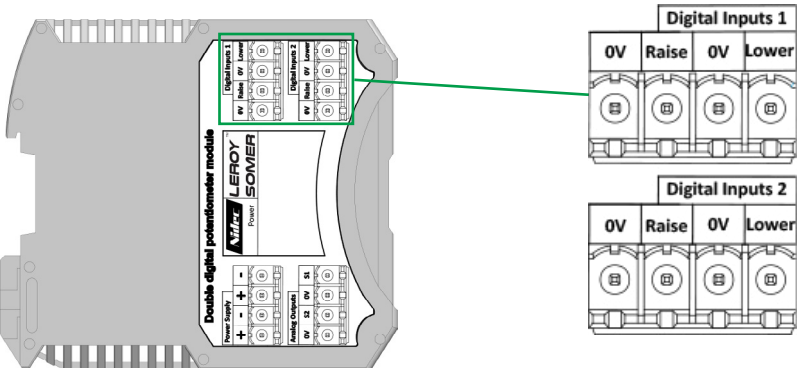
The Digital Potentiometer Module shall be connected as follows:

- Power Supply:



This connector provides the power supply for the module. The required supply voltage is 24 VDC. The module features two "+" terminals and two "-" terminals, which are internally connected to each other to facilitate wiring.

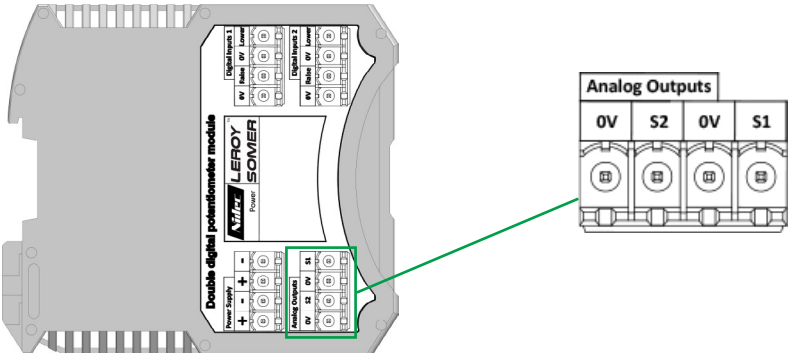
- Digital Inputs:



The module is equipped with two digital input interfaces, designated Digital Inputs 1 and Digital Inputs 2. Each interface includes four terminals: two interconnected 0 V terminals, one Raise terminal dedicated to increasing the output signal, and one Lower terminal dedicated to decreasing the output signal. These inputs are used to adjust the regulator setpoint through incremental or decremental control actions. The setpoint may correspond to various parameters, such as alternator voltage, power factor, or reactive power.

The digital inputs are typically controlled by auxiliary contacts from a PLC or a microcontroller. They may also be actuated by other dry-contact devices, such as relays, push-buttons, or any other discrete control device, allowing the state of the module inputs to be changed and the setpoint to be adjusted accordingly.

- Analog Output:



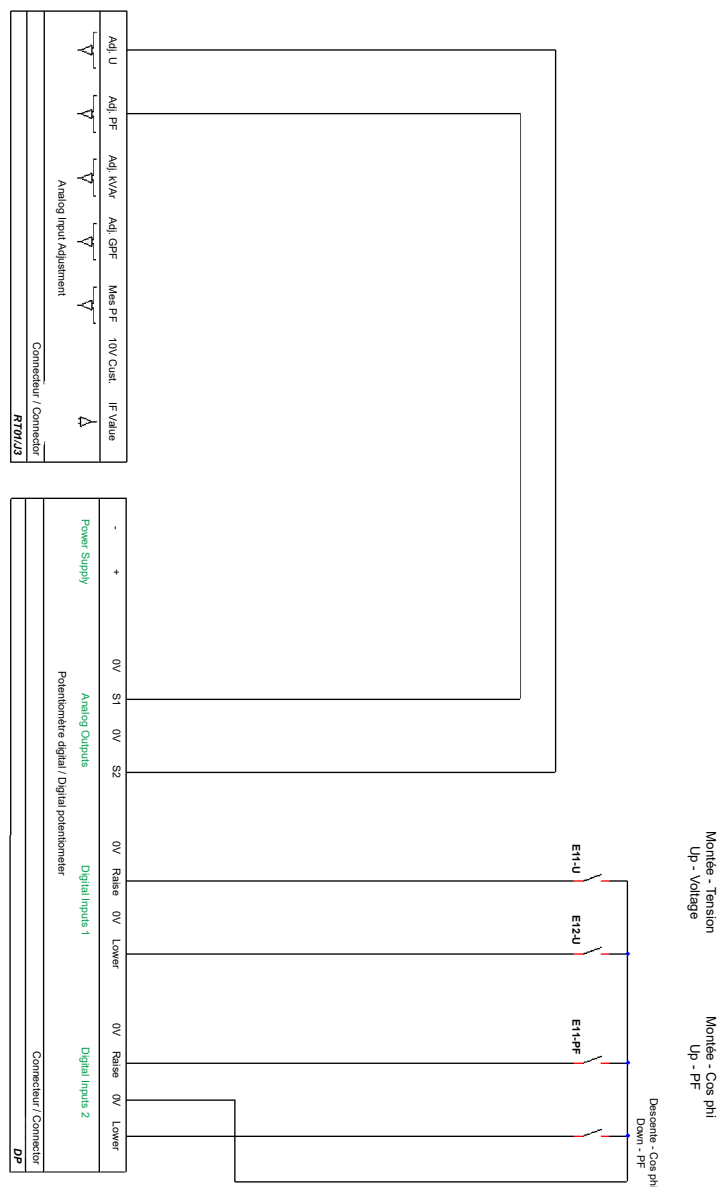
The module is equipped with an analog output interface, designated Analog Outputs, comprising four terminals: two interconnected 0 V terminals, one S1 terminal corresponding to the output signal of Channel 1, and one S2 terminal corresponding to the output signal of Channel 2.

For the R700 regulator, the S1 output is connected to the Adj.PF terminal to adjust the power factor setpoint, while the S2 output is connected to the Adj.U terminal to adjust the voltage setpoint, as shown in the R700 wiring diagram with the Digital Potentiometer Module below.

These two outputs are intended to be connected directly to the analog inputs of the voltage regulator.

DPM

Digital Potentiometer Module



Electrical Diagram

DPM

Digital Potentiometer Module

2.4. - Wiring Precautions

The connector terminals are designed to accommodate conductors with a maximum cross-sectional area of 4 mm².

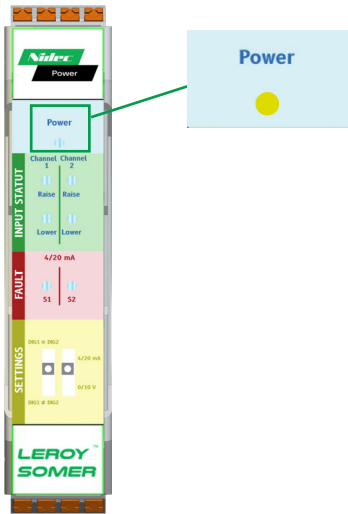
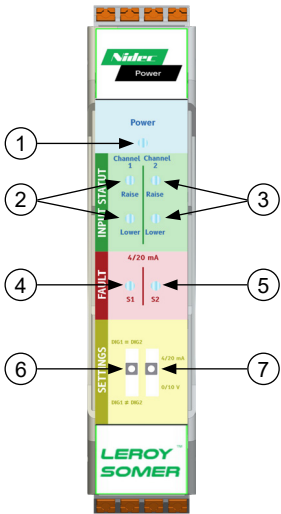
In all cases, the cable length shall not exceed 100 m. To ensure compliance with IEC 61000-6-2, IEC 61000-6-4, and IEC 60255-26, the use of shielded cables is mandatory when the module is installed outside the generator terminal box.



Particular care must be taken when wiring the module. Conductors used for all connections shall have a minimum cross-sectional area of 1.5 mm² and a maximum cross-sectional area of 4 mm². The use of wire ferrules is not recommended.

3 - OPERATING PRINCIPLE

When the power supply is applied, the Digital Potentiometer Module is switched on. The green "POWER" LED is lit.



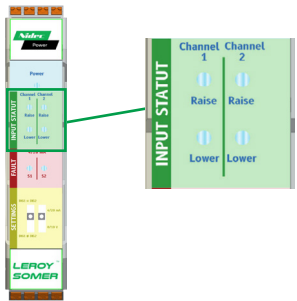
1. « POWER » LED
2. Channel 1 « Raise »/« Lower » LEDs
3. Channel 2 « Raise »/« Lower » LEDs
4. S1 Output 4–20 mA Fault LED
5. S2 Output 4–20 mA Fault LED
6. "DIG1=DIG2" / "DIG1≠DIG2" Switch
7. "4–20 mA" / "0–10 V" Switch

The module includes three additional sections:

- Input Status: "INPUT STATUS"
- 4–20 mA Output Fault: "FAULT"
- Input/Output Settings: "SETTINGS"

3.1. Input Status

The "INPUT STATUS" section allows verification of the correct operation of the "Raise" and "Lower" control inputs for both channels. During normal operation, the blue LEDs illuminate as shown in the figure below, and the output signals vary according to changes in the input states.



3.3. Input/Output Settings

The module also includes a "SETTINGS" section incorporating two configuration switches:

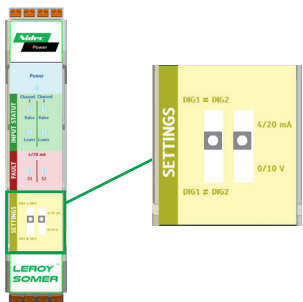
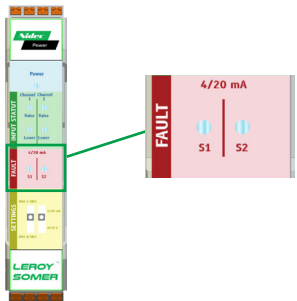
The first switch defines whether the input control signal for Channel 1 is identical to or independent from that of Channel 2 (DIG1 = DIG2 or DIG1 ≠ DIG2).

The second switch selects the output signal type (0–10 V or 4–20 mA).

When DIG1 ≠ DIG2 is selected, outputs S1 and S2 vary independently according to changes in the input states of Channel 1 and Channel 2, respectively. When DIG1 = DIG2 is selected, only the Channel 1 control inputs are active, and both S1 and S2 outputs are driven simultaneously by the Channel 1 commands.

3.2. 4–20 mA Output Fault Monitoring

The module is equipped with two LEDs associated with the S1 and S2 outputs, allowing verification of proper operation of the 4–20 mA outputs. These LEDs indicate that the output current is within the 4–20 mA range and that the current loop is correctly closed. In the event of a fault, a red LED illuminates as shown in the figure below.



Note: This module shall not be used as a protective device under any circumstances.

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DPM Digital Potentiometer Module		

4 - SETTINGS

4.1. Before Start-Up

Before performing any settings adjustment, it is important to identify the regulator setpoint input signal type (0–10 V or 4–20 mA), as well as the minimum and maximum setpoint values. The applied input signal is interpreted as a value proportional to the regulator control range.

4.2. Configuration Procedure

• **Step 1:** Check the module wiring to ensure that all connections are correct.

• **Step 2:** Power the module from a 24 VDC supply and verify that the “POWER” LED is illuminated.

• **Step 3:** Select the module output signal type according to the regulator setpoint input signal (0–10 V or 4–20 mA).

• **Step 4:** Define whether the input signals for Channel 1 and Channel 2 are identical or independent (DIG1 = DIG2 or DIG1 ≠ DIG2).

• **Step 5:** Perform the required adjustments on the alternator system.

5 - TEST RESULTS OF THE DIGITAL POTENTIOMETER MODULE

5.1. 0–10 V Setpoint Raise and Lower Signals

When the Lower command is actuated using a push-button, outputs S1 and S2 decrease to a minimum value of 0.016 VDC. When the Raise command is actuated, they increase to a maximum value of 10 VDC.

The full raise and lower travel time is 30 seconds, with an adjustment step every 300 ms, resulting in a total of 100 steps for a complete raise or lower cycle.

5.2. 4–20 mA Setpoint Raise and Lower Signals

Using the Raise and Lower push-buttons, outputs S1 and S2 vary from 0.14 mA to 20 mA. The raise and lower ramp time is 30 seconds, with an adjustment step every 300 ms, resulting in a total of 100 steps for a complete raise or lower cycle.

6 - MAINTENANCE INSTRUCTIONS

6.1. Maintenance Warning Symbols



Refer to Section 1.4 – General Safety Requirements and Instructions. Preventive maintenance of the Digital Potentiometer Module shall be carried out only with the alternator stopped and all power sources switched off and isolated.

6.2. Preventive Maintenance Instructions

During alternator shutdown periods scheduled for preventive maintenance, check that all conductors are securely fastened in the connector terminals. Use clean, dry compressed air to remove any dust that may have accumulated on or around the module.

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DPM Digital Potentiometer Module		

6.3. Faults and Troubleshooting

FAULTS	CAUSES	REMEDIES	RESTART
No module power supply	Incorrect power supply wiring	Check the wiring	Reapply the power supply and verify that the “POWER” LED is illuminated.
	Internal component failure	Replace the module	Refer to the instructions in Section 2, “Installation and Wiring Instructions”, and Section 4, “Settings”.
No active relay outputs	Incorrect measurement	Check the wiring	Restart the power supply and check the alternator voltage.
	Wrong input signal type selected	Check the input signal type selection.	Refer to Section 4, “Settings”, and follow the adjustment procedure
	Incorrect DIG1/DIG2 configuration	Check the module settings	Refer to Section 4, “Settings”, and follow the adjustment procedure
	Relay failure	Replace the module	Refer to the instructions in Section 2, “Installation and Wiring Instructions”, and Section 4, “Settings”.

7 - RECYCLING INSTRUCTIONS

MOTEURSLEROY-SOMER™ is committed to environmental protection and strives to minimize the environmental impact of its manufacturing processes and products throughout their entire life cycle. To support this commitment, an Environmental Management System (EMS) certified to the international ISO 14001 standard is implemented.

Digital Potentiometer Modules manufactured by MOTEURSLEROY-SOMER contribute to energy savings and help reduce the consumption of raw materials and scrap throughout their service life through improved machine and process efficiency. In most applications, these environmental benefits significantly outweigh the impacts associated with product manufacture and end-of-life disposal.

At the end of their service life, products should not be discarded as general waste. They should be recycled by a specialist in electronic equipment recycling, who can easily dismantle the main components and recover the materials efficiently. Many parts are clipped together and can be removed without tools, while others are secured using standard fasteners. Almost all components of the product are recyclable.

The packaging is of high quality and can be reused. Large products are packed in wooden crates, while smaller products are supplied in cardboard boxes made largely from recyclable fibres. Where reuse is not possible, the packaging materials can be recycled. The polyethylene used for protective wrapping and packaging bags is also recyclable.

When recycling or disposing of a product or its packaging, always comply with local regulations and use the most appropriate recycling and waste-management facilities available.

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DPM Digital Potentiometer Module		

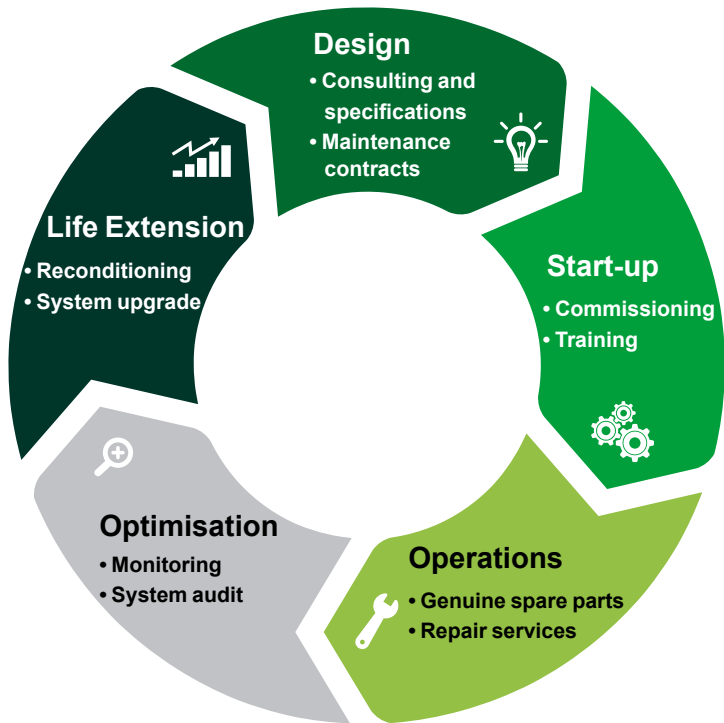
Service & Support

Our worldwide service network of over 80 facilities is at your service. Our local presence is your guarantee for fast and efficient repair, support and maintenance services.

Trust your alternator maintenance and support to electric power generation experts. Our field personnel are 100% qualified and fully trained to operate in all environments and on all machine types.

We have a deep understanding of alternators operations, providing the best value service to optimize your cost of ownership.

How can we help:



Contact us:
Americas: +1 (507) 625 4011
EMEA: +33 238 609 908
Asia Pacific: +65 6250 8488
China: +86 591 8837 3010
India: +91 806 726 4867

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