Materials Services I Materials Germany

Current regulator for switchable magnetic systems

Operation Instruction

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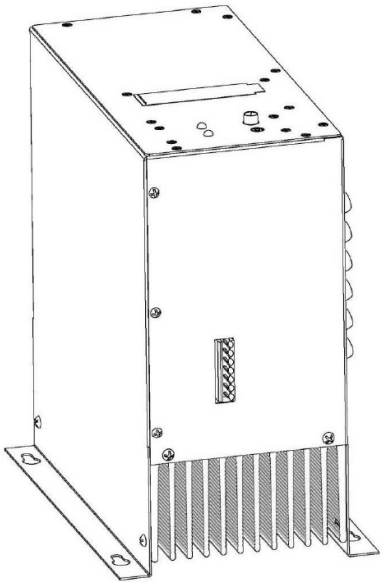
Current regulator – Product-Model M90011800A905N

Operation instruction



Please keep this manual for future reference.

- This manual contains all safety, installation, and operation instructions for the current regulator. Please read all instructions and precautions in the manual carefully before installation and use.
- In order to avoid personal injury, users should not disassemble it by themselves.
- Please do not install the current regulator in a humid, greasy, flammable and explosive environment or with a mass of dust.
- The mains input and AC output are high voltage. Please do not touch the connecting wires.
- When the current regulator is working, the shell temperature is high. Please do not touch it.
- Do not open the housing during operation.
- It is recommended to install an appropriate safety or circuit breaker outside the current regulator.
- Disconnect the mains input before installing and adjusting the wires to the current regulator (Both AC and DC need to be completely disconnected).
- In order to avoid the danger of heat accumulation due to virtual connection, we need to check whether all the wires are connected tightly after installation.

Content

1. Product overview

1.1. Product overview and features

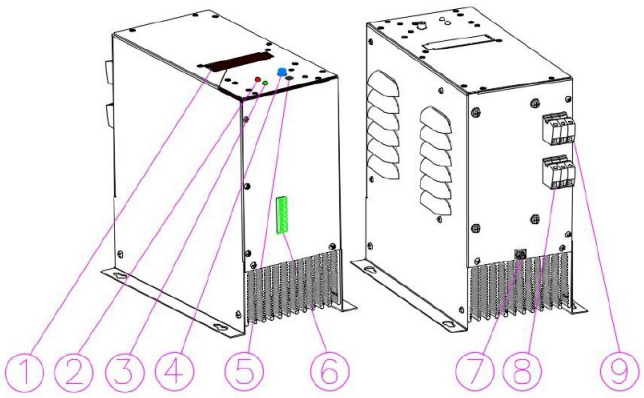
- Current regulators are specifically designed for switching inductive loads, i.e. from electric exchangeable magnet system – based on Magnetic Field Displacement Theory – or pure electromagnetic system. As far as control technology is concerned, there is the principle of „step-down circuit".
- The controller has passed the CE certification of EN 61326-1: 2013 standard in accordance with interference and radiation guidelines. It is necessary to include connecting shielded cables from the current controller to the magnet system. Three-phase input filters can reduce network feedback that has been integrated. The corresponding output filter is also used to filter the input grid voltage. You can also use any other compatible type provided by other manufacturers.
- These are monostable magnet systems that are magnetically neutral when a current is flowing. In order to achieve this field displacement during the current flow, a constant, regulated current is required, which is maintained within the temperature range, so that heating of the coil is irrelevant.
- For pure electromagnetic systems, the adhesion force does not depend on the coil temperature but depends on the coil current, so a constant coil current is also essential. A minimal adhesion force must be guaranteed when it comes to secure applications. So it works as energy-saving as possible, i.e. the energy losses are minimized using the pulse width modulation principle.

Features:

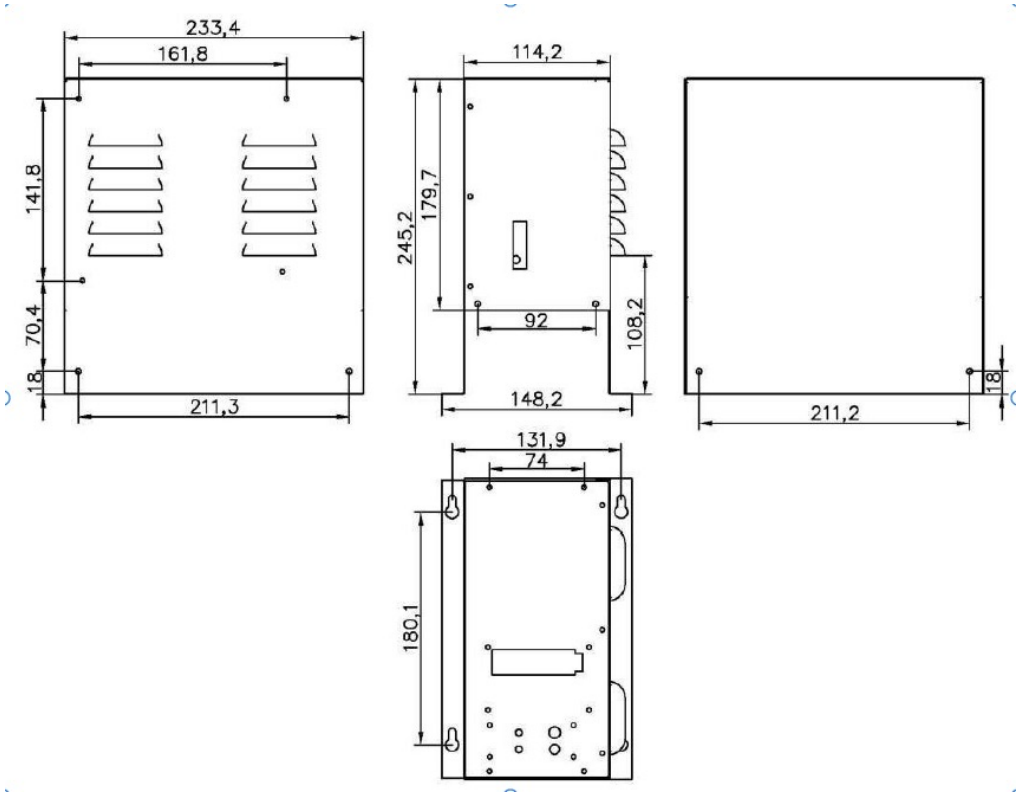
1. It adopts high precision current sampling closed-loop control and advanced PWM technology. The output current is accurate and adjustable.
2. Control signal and power high voltage area are completely isolated, which is safe and secure.
3. There are two kinds of current regulation modes: panel high precision potentiometer regulator and external input analog voltage control regulator.
4. Outputting high and low level status signals to control devices is convenient to control PLC and other equipment.
5. LCD screen design, 2 LED indicator lights, dynamic display data and running status.
6. There are two ways to control the current output: one is that pressing the button is to output and disconnecting is off, which is flexible, the other one is that turning on high potential is for long-term output.
7. It has a number of protection functions, 360° all-round protection.
8. It has complete overload protection, over temperature protection, short circuit protection and so on.

1.2 Product features

1. LCD Display Screen
2. Operation Indicator Light
3. Control Power Signal Indicator Ligh
4. Current Regulating Knob
5. Current Output Tact Switch
6. Control Voltage Input Interface
7. Grounding Screw M5
8. Load Output Terminal
9. Input Terminal



1.3 Dimension diagram



2. Installation instructions

2.1 Installation notes

Before installation, please read this manual carefully and familiarize yourself with the installation procedure.

1. When installing the product, be sure to leave enough space around the current regulator for heat dissipation. Do not place the current regulator in a closed environment and do not cover the machine housing with any object.
2. Virtual connection points and corroded wires may cause great heat, which may melt wire insulation, burn the surrounding materials, and even lead to fire. To avoid loosing connectors it is necessary to ensure that the connectors are tightened and wires are fixed with cable ties.
3. Select the system connecting wires based on the current density not greater than 5A/mm^2.
4. Outdoor installation should avoid direct sunlight and rainwater infiltration.
5. After the power switch is turned off, there is still residual voltage in the current regulator. So do not open or touch the internal devices until the capacitor is discharged.
6. Do not install the current regulator in a humid, greasy, flammable and explosive environment or with a mass of dust.
7. The mains input and AC output are high voltage wires. Do not touch the connecting wires.
8. The input power supply to the load equipment must be confirmed so that the current regulator is controlled as the only input device with a separate circuit breaker. To avoid damage to the equipment, the currrent regulator must not be used in parallel with other input AC power sources with a common circuit breaker.

2.2 Wiring specifications and circuit breaker selection

- Wiring and installation must comply with the national and local electrical regulations.
- Recommended input wiring specifications and circuit breaker selection:

AC (single-phase) input wire diameters and switches			
Model number	Recommended AC input wire diameter	Input current	Recommended model of air switch or circuit breaker
M90011800A905N	3 mm²	18A	2P - 25A

Note: In series connection, the voltage must not exceed the maximum PV input open-circuit voltage.

AC (three-phase) input wire diameters and switches			
Model number	Recommended AC input wire diameter	Input current	Recommended model of air switch or circuit breaker
M90011800A905N	1,5 mm²	6A	3P - 8A

Note: A corresponding circuit breaker is available at the mains input connection, so even if there is no more circuit breaker, it can work normally.

DC (single-phase) input wire diameters and switches			
Model number	Recommended DC input wire diameter	Input current	Recommended model of air switch or circuit breaker
M90011800A905N	1,5 mm²	6A	2P - 8A

Note 1: Wire diameter is for reference only. If the distance is far, to improve system performance and electrical safety, the use of thicker wires can reduce the voltage drop.

Note 2: The preceding wiring diameters and circuit breakers are for recommendation only. Please select a proper wiring diameter and circuit breaker based on your actual condition.

2.3 Installation and wiring

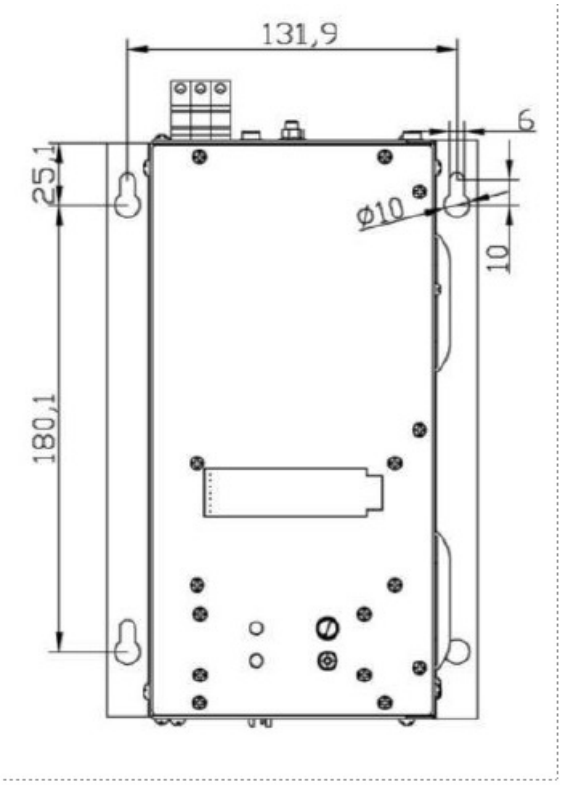
Installation steps:

Step 1: Determine the installation position, heat dissipation space, the position of the current regulator. Such as other device inside, when installing the current regulator, in order to ensure natural convection heat dissipation, make sure that enough air flows through the heat sink of the current regulator, and to leave at least 200mm space for both the left and right air outlet of the current regulator. Please refer to the preceding installation diagram.

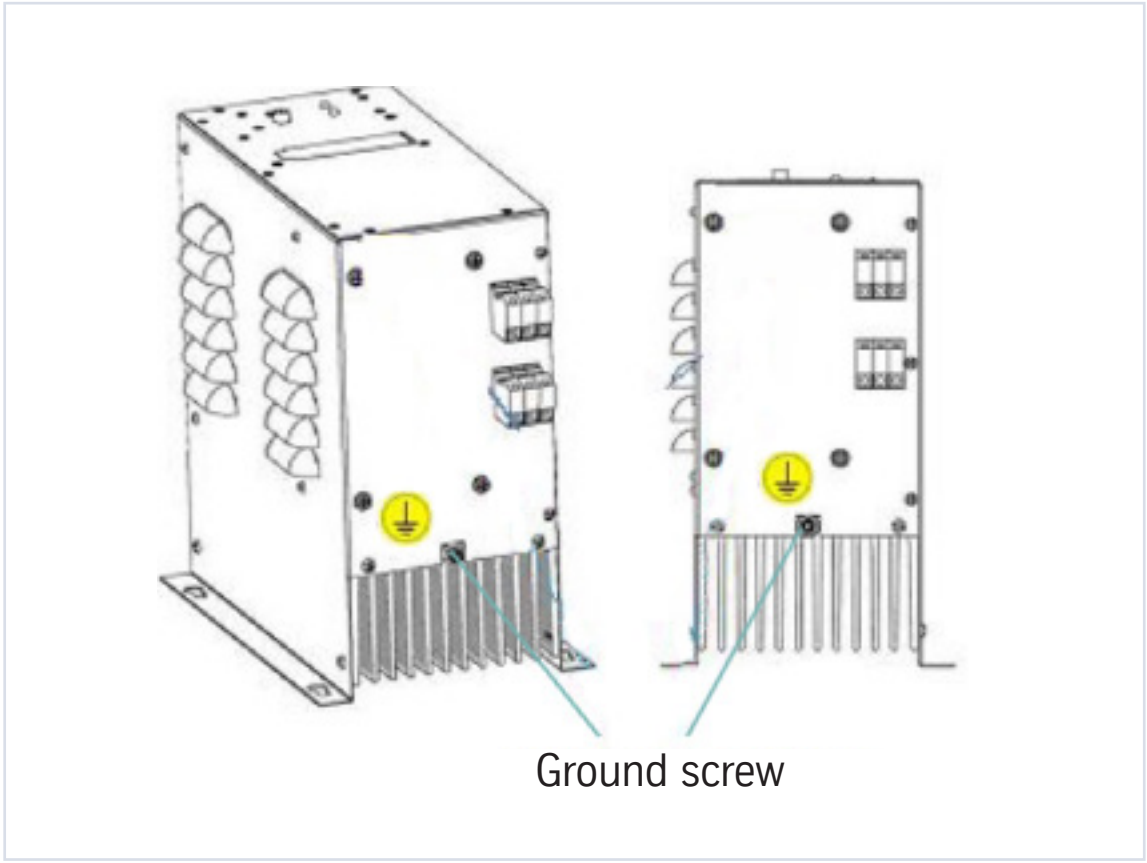
Step 2: Fix the four mounting pins (gourd holes) of the current regulator. As is shown in the diagram, Fix with M5x10 cross round head combination screws. And the distance between mounting holes is 131.9x180.1.

Step 3: Wiring

The connection method of input wire AC (DC)

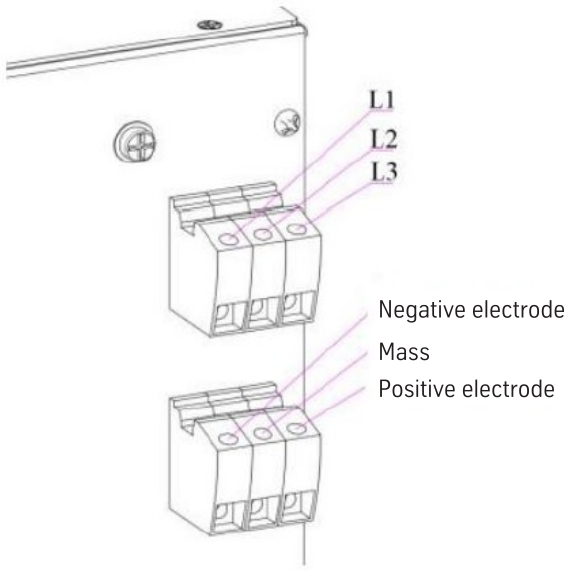


The connection method of three phase wire: Connect L1, L2, L3 to the input wire L1, L2, L3, and connect the ground wire to the chassis.



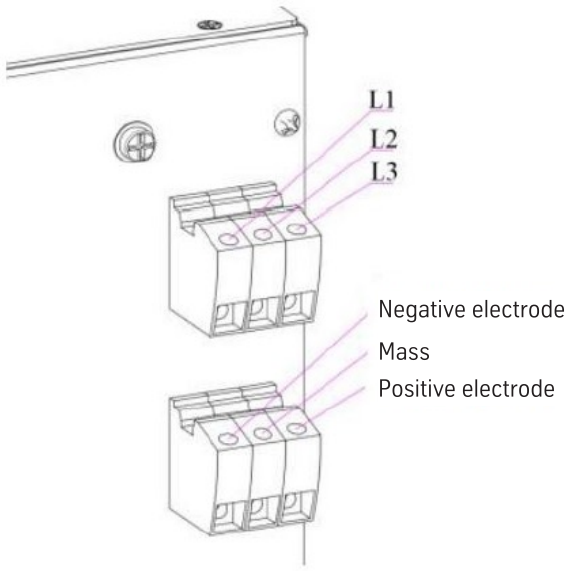
The connection method of single-phase wire: Connect the L and N wires to any two wires of the input wires L1, L2, L3, and connect the ground wire to the chassis.

AC Input Connection Method



The connection method of DC wires: Connect the DC input power supply to any two wires of the input wire L1, L2, L3

DC Input Connection Method

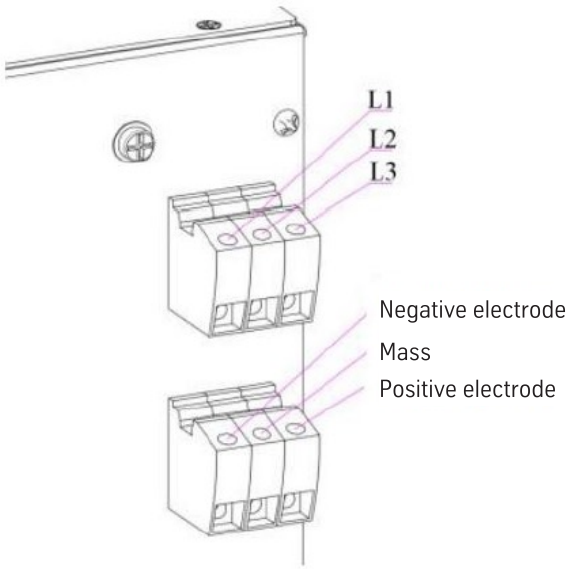


Note: The cross section of the wire should be at least 4mm². The ground point should be as close as possible to the current regulator.

The connection method of load output:

Connect positive and negative wires of the output load to the positive and negative output terminals of the current regulator, and to the ground wire output terminal of the current regulator. Please refer to the output label of the current regulator.

The connection method of load output



The connection method of control signal

As is shown in the following diagram:

- The first pin is connected to 24V DC power supply.
- The second pin is connected to 1-10V Analog signal (DC voltage).
- When the second pin is not connected to the external analog signal, the second pin and the third foot are connected. And the rotating potentiometer can output current 1.5-15A.
- External output high and low level. Estimate whether the current regulator works normally, or can be connected to PLC.
- When it continuously output current, it needs to be connected to voltage 12-24V.
- The sixth and seventh pin is grounded.

Warning

The mains input and AC output will produce a very high voltage. Before wiring, be sure to disconnect the circuit breaker or safety.

Pay attention to safety when connecting the wires. Do not close the circuit breaker or safety. Make sure the input and output of each component connector are properly connected. On the input terminal, a circuit breaker must be installed. For details on how to select the circuit breaker, please refer to section 2.2 Wiring Specifications and Circuit Breaker Selection. Before connecting wires, disconnect the circuit breaker to prevent strong spark and short circuit during wiring. If the current regulator is applied in lightning frequent areas, it is recommended to install an external lightning arrester at the input.

Note:

- In order to avoid system problems, we need to check whether the wires are connected correctly according to the preceding wire connection diagram before connecting an external 24V power supply and turning on the display.
- In order to avoid abnormal operation of the system caused by wire off, make sure that all the wires are fixed firmly.
- To avoid the damage to the load device, make sure that all the wires are connected correctly according to the requirement of the electrical load device, when connecting the output wires to the load.

3. Operating mode

3.1 Output method

1. Press the button. There is output when the switch is on, there is no output when the switch is off.
2. Connect pin 5 to DC12-24V power supply, the current regulator will always has an output.

3.2 Current regulation method

1. Connect the second pin to analog DC1-10V, the corresponding output current is 1.5-15A.
2. Connect pin2 and pin3. Regulate the potentiometer and the voltage. The corresponding output current is 1.5-15A, also.

4. System maintenance

In order to maintain the best long-term performance, it is recommended that the following items should be inspected twice a year.

1. Make sure the airflow around the current regulator is not blocked and remove any dirt or debris from the heat sink.
2. Check all the exposed wires for insulation damage because of sun exposure, friction with the around objects, dry rot, the destruction of insects and rodents, etc. If necessary, repair or replace the wires.
3. The verification indication and display correspond to the operation of the device.
   Please pay attention to any fault or error display. If necessary, take corrective action.
4. Check all terminals for signs of corrosion, insulation damage, high temperature, burning or discoloration. And tighten terminal screws.
5. Check for dirt and corrosion and clean as required.
6. If the arrester has failed, replace the failed arrester promptly to prevent lightning damage to the current regulator or other equipment of the user.

ⓘ Shock hazard

Before performing the preceding operations, ensure that all the power supplies of the fusion cube are disconnected, and all the capacitor power is discharged. Then, perform the corresponding checks and operations.

The company does not assume any responsibility for the damage caused under the following circumstances.

1. Damage caused by improper use or use in unsuitable places.
2. The input voltage exceeds the maximum allowable voltage.
3. Damage caused by working environment temperature exceeding the limit working temperature range.
4. Disassemble and repair the current regulator without permission.
5. Damage caused by force majeure: Damage occurred during transportation or loading the current regulator.

5. Specification

Supply voltage: 130-500Vdc **Alternatively:** 100-480Vac **Or:** 100-480Vac
Control voltage: 24Vdc±10%
Voltage controlled current: 300mA
Control frequency: 19KHz
Model: M90011800A905N
ED=Maximum Output Current at 100%: 15A
Minimum Output Current(Pre-set): 1.5A
4 Pin High Level: The output current of the current regulator is normal.

Low level is no output.

Control voltage: Max 24Vdc
The current at 24 Volt: Max 300mA

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Declaration of Conformity

thyssenkrupp

We

thyssenkrupp Magnettechnik
branch of thyssenkrupp Schulte GmbH
Am Hellweg 7
44805 Bochum, Germany

declare that the following product

Product: Three Phase Current Regulator
Part number: M90011800A905N

complies with the regulations of the following standards and directives:

- EN 61010-1:2010+A1:2019
- EN 61326-1:2013
- Low Voltage Directive: 2014/35/EU
- EC Council Directive: 2014/30/EU
- RoHS Directive: 2011/65/EU, (EU)2015/863
- REACH Directive: EG-No. 1907/2006

Bochum, 26.05.2023

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