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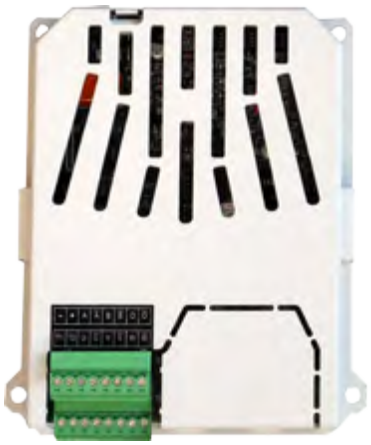

Installation and commissioning manual

MDX-I/O LITE

Additional I/O module

POWERDRIVE MD2/FX

Part number: 5215 en - 2017.08 / c

LEROY-SOMER™

NOTE

LEROY-SOMER reverses the right to modify the characteristics of its products at any time in order to incorporate the latest technological developments. The information contained in this document is therefore liable to be changed without notice.

CAUTION

For the user's safety, the variable speed drive to which the module covered by these instructions is fitted must be connected to an approved earth (terminal ⏚).

If accidentally starting the installation is likely to cause a risk to personnel or the machines being driven, it is essential to supply the equipment via a circuit-breaking device (power contactor) which can be controlled via an external safety system (emergency stop, detection of errors on the installation).

The variable speed drive is fitted with safety devices which, in the event of a fault, order it to stop and, at the same time, stop the motor. The motor itself can become jammed for mechanical reasons. Voltage fluctuations, and in particular power cuts, may also cause the motor to stop.

The removal of the causes of the shutdown can lead to restarting, which may be dangerous for certain machines or installations. In such cases, it is essential that the user takes appropriate precautions against the motor restarting after an unscheduled stop.

The variable speed drive is designed to be able to supply a motor and the driven machine above its rated speed.
If the motor or the machine are not mechanically designed to withstand such speeds, the user may be exposed to serious danger resulting from their mechanical deterioration.
Before programming a high speed, it is important that the user checks that the installation can withstand it.

The variable speed drive on which the module, covered by this manual, is fitted is designed to be integrated in an installation or an electrical machine, and can under no circumstances be considered to be a safety device. It is therefore the responsibility of the machine manufacturer, the designer of the installation or the user to take all necessary precautions to ensure that the system complies with current standards, and to provide any devices required to ensure the safety of equipment and personnel.

Using the drive for hoisting: when using this application, it is essential to follow the special instructions in an application-specific manual which is available on request. It is the responsibility of the user to obtain this manual from his usual LEROY-SOMER contact.

LEROY-SOMER declines all responsibility in the event of the above recommendations not being observed.

(In accordance with the low voltage directive 2006/95/EC)

⚠ Throughout the manual this symbol warns of consequences which may arise from inappropriate use of the drive, since electrical risks may lead to material or physical damage as well as constituting a fire hazard.

1 - General

Depending on their degree of protection, variable speed drives may contain unprotected live parts, which may be moving or rotating, as well as hot surfaces, during operation.
Unjustified removal of protection devices, incorrect use, faulty installation or inappropriate operation could represent a serious risk to personnel and equipment.
For further information, consult the documentation.
All work relating to transportation, installation, commissioning and maintenance must be performed by experienced, qualified personnel (see IEC 364 or CENELEC HD 384, or DIN VDE 0100 and national specifications for installation and accident prevention).
In these basic safety instructions, qualified personnel means persons competent to install, fit, commission and operate the product, and possessing the relevant qualifications.

2 - Use

Variable speed drives are components designed for integration in installations or electrical machines.
When integrated in a machine, commissioning must not take place until it has been verified that the machine conforms with directive 2006/42/EC (Machinery Directive). It is also necessary to comply with standard EN 60204, which stipulates in particular that electrical actuators (which include variable speed drives) cannot be considered as circuit-breaking devices and certainly not as isolating switches.
Commissioning can taken place only if the requirements of the Electromagnetic Compatibility Directive (EMC 2004/108/EC) are met.
The variable speed drives meet the requirements of the Low Voltage Directive 2006/95/EC. The harmonised standards of the DIN VDE 0160 series in connection with standard VDE 0660, part 500 and EN 60146/VDE 0558 are also applicable.
The technical characteristics and instructions concerning the connection conditions specified on the nameplate and in the documentation provided must be observed without fail.

3 - Transportation, storage

All instructions concerning transportation, storage and correct handling must be observed.
The climatic conditions specified in the technical manual must be observed.

4 - Installation

The installation and cooling of equipment must comply with the specifications in the documentation supplied with the product.
Variable speed drives must be protected against any excessive stress. In particular, there must be no damage to parts and/or modification of the clearance between components during transportation and handling. Avoid touching electronic components and contact parts.
Variable speed drives contain parts which are sensitive to electrostatic stresses and may be easily damaged if handled incorrectly.
Electrical components must not be exposed to mechanical damage or destruction (risks to health!).

5 - Electrical connection

When work is performed on variable speed drives which are powered up, national accident prevention regulations must be respected.
The electrical installation must comply with the relevant specifications (for example conductor cross-sections, protection via fused circuit-breaker, connection of protective conductor). More detailed information is given int the documentation.
Instructions for an installation which meets the requirements for electromagnetic compatibility, such as screening, earthing, presence of filters and correct insertion of cables and conductors, are given in the documentation supplied with the variable speed drives. These instructions must be followed in all cases, even if the variable speed drive carries the CE mark.
Adherence to the limits given in the EMC legislation is the responsibility of the manufacturer of the installation or the machine.

6 - Operation

Installations which incorporate variable speed drives must be fitted with additional protection and monitoring devices as specified in current relevant safety regulations, such as the law on technical equipment, accident prevention regulations, etc. Modifications to variable speed drives using control software are permitted.
Active parts of the device and the live power connections must not be touched immediately after the variable speed drive is powered down, as the capacitors may still be charged. In view of this, the warnings fixed to the variable speed drives must be observed.
Permanent magnet motors generate electrical energy while they are rotating, even when the drive is switched off. In this case, the drive continues to be powered by the motor terminals. If the load is capable of turning the motor, a switching device must be provided upstream of the motor to isolate the drive during maintenance operations.
During operation, all doors and protective covers must be kept closed.

7 - Servicing and maintenance

Refer to the manufacturer's documentation.

This manual is to be given to the end user.

NOTE

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1 - GENERAL INFORMATION

1.1 - General

The MDX-I/O LITE module is used to increase the number of drive inputs and outputs. This option is fully configurable.

Details of functions:

- 1 analog input
- 2 analog outputs
- 1 temperature sensor input
- 2 digital inputs
- 1 digital output
- 1 assignable relay

1.2 - Dimensions

This MDX-I/O LITE option can be integrated in any product in the POWERDRIVE MD2/FX range. The dimensions remain the same for POWERDRIVE MD2/FX drives in a cabinet or enclosure.

The product depth is increased by 27 mm for the POWERDRIVE FX.

• The MDX-I/O LITE option cannot be combined with the MDX-I/O M2M option.

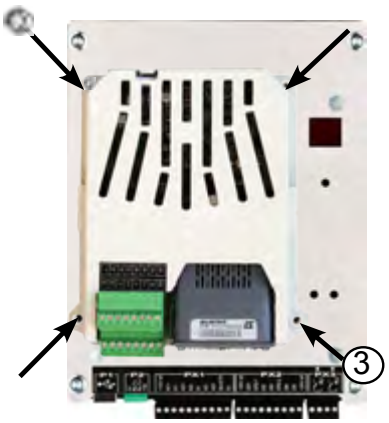
2 - INSTALLATION

• Before carrying out any work on the drive, disconnect and padlock the isolating switch in the switchboard.
• After the drive is switched off, the external control circuits can retain a dangerous amount of voltage. Check that these circuits are powered down before working on the control cables.
• After powering down the drive, wait at least 10 minutes before working on it.
• Check that the DC bus voltage is below 40 V before carrying out any work (the control board power-on indicator LED must be off).
• Check that the module is in good condition: never insert a damaged module in the drive.

2.1 - MDX-I/O LITE module

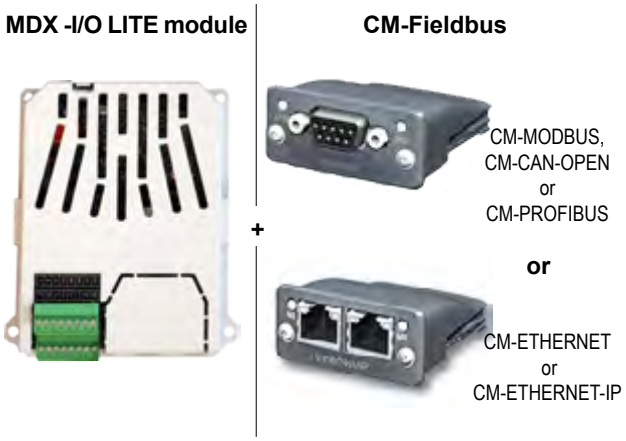
• Remove the black plastic protective cover from the drive control board (connector protection) (1).
• Align the optional module over the drive connector. The optional module connector is located on the underside of the housing. Press gently until it clicks into place.
• Screw the module onto the drive control board with the supplied screws (3). Do not exceed a maximum tightening torque of 2 N.m.

MDX-I/O LITE module



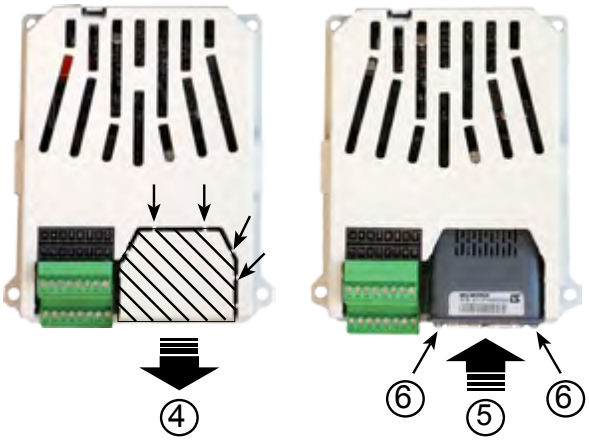
2.2 - MDX-I/OLITEmodulecombinedwitha CM-Fieldbus option

2 options are needed:



• On the MDX-I/O LITE module: remove the plastic knock-out (4).
• Insert the back of the CM-Fieldbus into the space freed up (5) and screw tight (6) (2 Torx 8 screws).

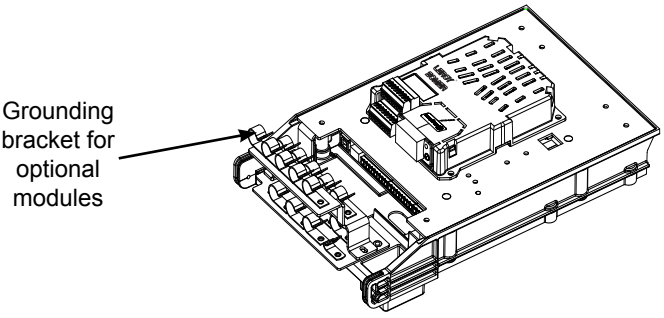
The CM module must be inserted carefully to avoid damaging the connector.



• Install the MDX-I/O LITE & fieldbus module on the **POWERDRIVE MD2/FX**, as shown in section 2.1.

2.3 - Grounding bracket

A bracket for connecting the shielding is supplied with the option. To attach it, screw in the bracket, placing it on top of the control cable shielding clamps.



3 - CONNECTIONS AND CHARACTERISTICS

⚠ • Check that the DC bus has discharged before any work is carried out (wait at least 10 minutes after powering down). For the safety instructions relating to the drive, please refer to the manual supplied with the product.

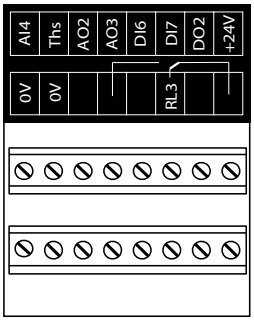
• The digital inputs on the POWERDRIVE MD2/FX and MDX-I/O LITE module have a positive logic configuration. Using a drive with a control system which has a different control logic may cause unwanted starting of the motor.

• The POWERDRIVE MD2/FX and MDX-I/O LITE module control circuit is isolated from the power circuits by single insulation. Its electronic 0 V is connected to the connection terminal on the outer protective conductor (earth terminal). The installer must ensure that the external control circuits are isolated against any human contact.

• If the POWERDRIVE MD2/FX or MDX-I/O LITE module control circuits need to be connected to circuits conforming to SELV safety requirements, additional insulation must be inserted to maintain the SELV classification.

3.1 - Connections

Both the PX4 connectors are removable and foolproof.



3.2 - Characteristics

• PX4 connector

1	**AI4**	**Analog input 4**
Facory setting		No assignment
Input type		± 10V bipolar analog voltage in common mode or unipolar current (0 to 20mA, 4 to 20mA)
Resolution		11 bits + sign
Sampling period		2 ms
Input filter bandwidth		~ 200Hz
Voltage range in common mode		± 24V / 0V
Voltage mode		
Input impedance		50 kΩ
Absolute maximum voltage range		± 30V
Current mode		
Input impedance		100 Ω
Absolute maximum current		30 mA

2	**Ths**	**KTY84-130 or PT100 thermal sensor**
Factory setting		KTY
Sampling period		2 ms

3	**AO2**	**Analog output 2**
4	**AO3**	**Analog output 3**
Factory setting		No assignment
Output type		Bipolar analog voltage in common mode or unipolar current in common mode
Resolution		13 bits
Sampling period		2 ms
Voltage mode		
Voltage range		± 10V
Load resistance		1 kΩ minimum
Current mode		
Current range		0 to 20 mA, 4 to 20 mA
Load resistance		500Ω maximum

5	**DI6**	**Digital input 6**
6	**DI7**	**Digital input 7**
Factory setting		No assignment
Type		Digital inputs in positive logic
Voltage range		0 to + 24V
Absolute maximum voltage range		0 to 35V
Thresholds		0: < 5V 1: > 10V
7	**DO2**	**Digital output 2**
Factory setting		No assignment
Type		Open collector
Absolute maximum voltage		+30V / 0V
Overload current		200 mA

8	**+24 V**
Output current	100 mA
Accuracy	± 5%
Protection	Current limiting and setting to trip mode

9	**0V**	**0V common**
10	**0V**	**0V common**

11 **13** **15**	**Do not connect anything**

12	**RL3**	**RL3O relay output**
14		**RL3C relay common**
16		**RL3F relay output**
Contact voltage		250 Vac
Maximum contact current		2A, resistive load 1A, inductive load

• Provide a fuse or overcurrent protection in the relay circuit.

4 - COMMISSIONING

• The drives use software which is adjusted by parameters. The performance levels obtained depend on the parameter setting. Inappropriate settings may have serious consequences for personnel and machinery.

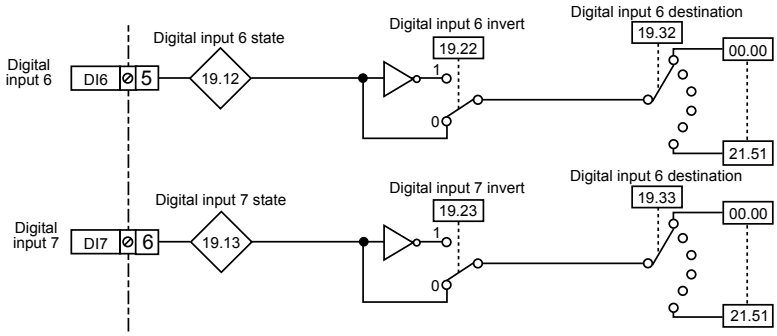
• The drive parameters must only be set by appropriately qualified and experienced personnel.

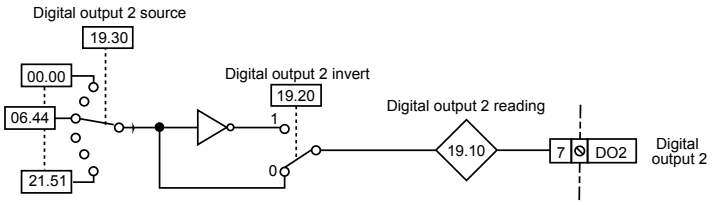
4.1 - General

The **MDX-I/O LITE** module parameters are set using menu 19.

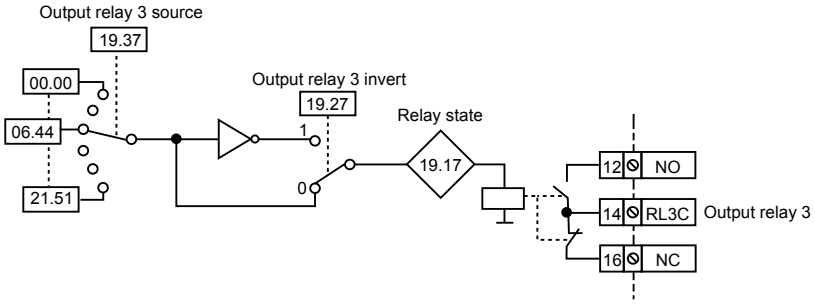
4.2 - Diagrams

• Digital inputs and output

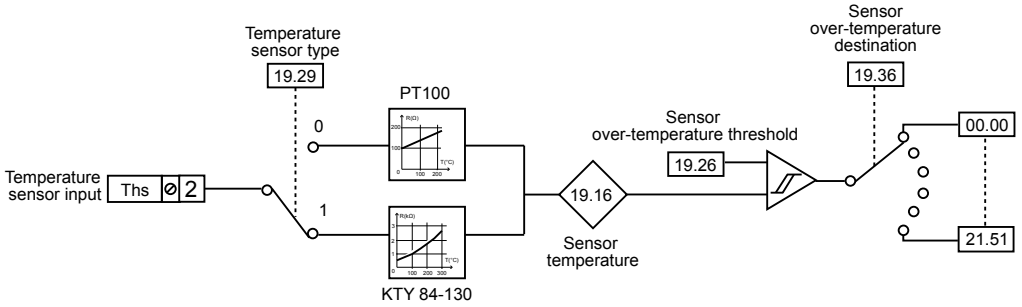




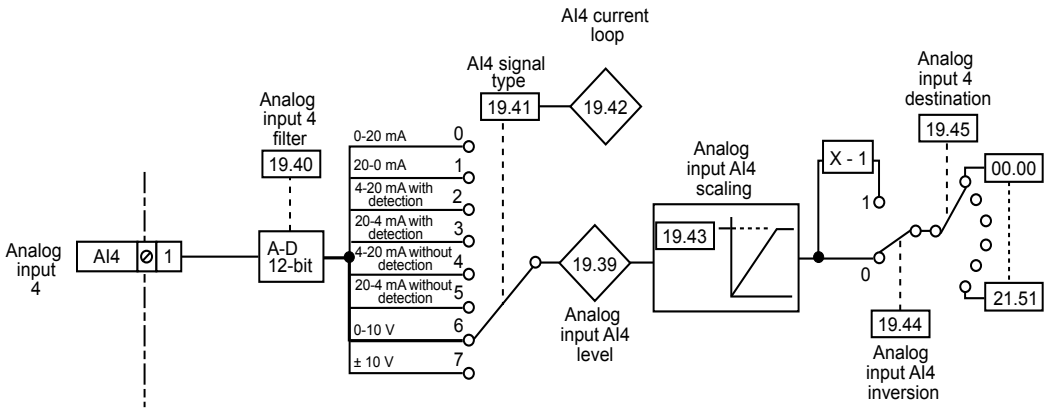
• Relay output

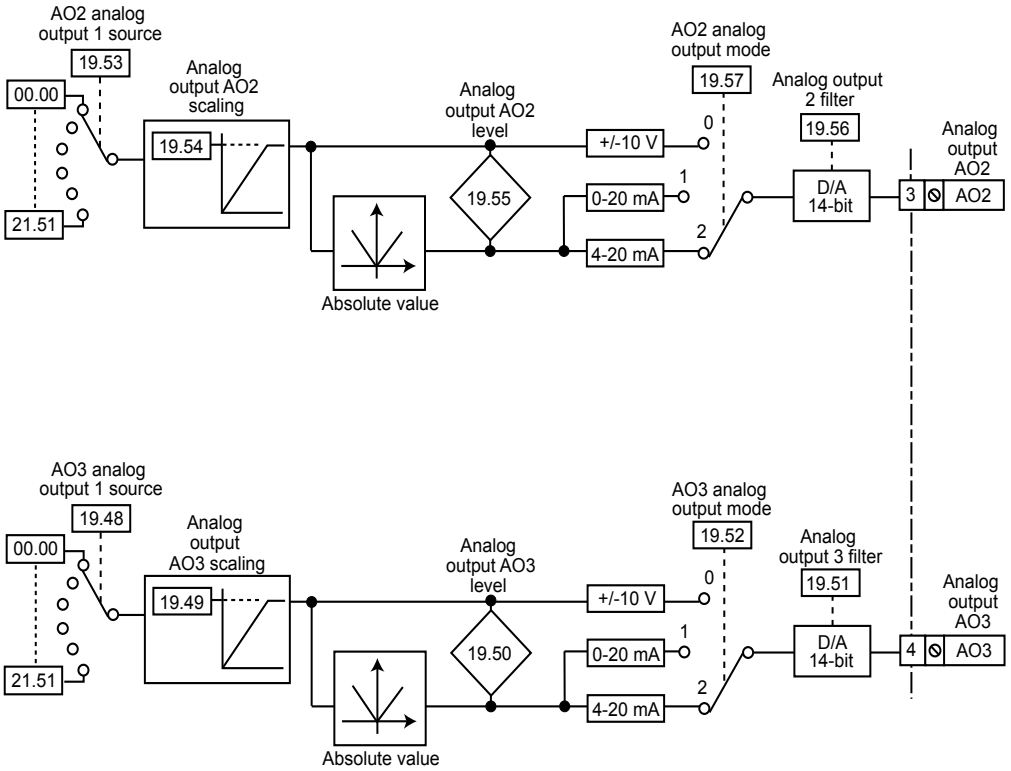


• Temperature sensor input



• Analog input and outputs





4.3 - Explanation of parameters

19.01 : Option type

Adjustment range : 0 to 512
Format : 16-bit

19.01	Option module correspondence
0	No module
1	MDX-I/O M2M
2	MDX-I/O LITE

19.02 : Option software version

Adjustment range : 0 to 99.99
Format : 16-bit
Indicates the option software version, defined by 4 digits.

19.03 to 19.09 : Not used

19.10 : DO2 reading

Adjustment range : Inactive (0) or Active (1)
Format : 8-bit
This parameter indicates the state of the output.

19.09 : Not used

19.12 : DI6 state

Adjustment range : Inactive (0) or Active (1)
Format : 8-bit
This parameter indicates the state of the digital input.

19.13 : DI7 state

Adjustment range : Inactive (0) or Active (1)
Format : 8-bit
This parameter indicates the state of the digital input.

19.14 and 19.15 : Not used

19.16 : Sensor temperature (KTY 84-130 or PT 100)

Adjustment range : 0 to 200°C
Format : 16-bit
Indicates the temperature given by the sensor.

19.17 : Output relay 3 state

Adjustment range : RL3 open (0) or RL3 closed (1)
Format : 8-bit
This parameter indicates the state of the output relay.

19.18 and 19.19 : Not used

19.20 : Digital output 2 invert

Adjustment range : No (0) or Yes (1)
Factory setting : No (0)
Format : 8-bit
This parameter is used to invert the state of the digital output.

No (0): not inverted.

Yes (1): inverted.

19.21 : Not used

19.22 : Digital input 6 invert

Adjustment range : No (0) or Yes (1)
Factory setting : No (0)
Format : 8-bit
This parameter is used to invert the state of the digital input.

19.23 : Digital input 7 invert

Adjustment range : No (0) or Yes (1)
Factory setting : No (0)
Format : 8-bit
This parameter is used to invert the state of the digital input.

19.24 and 19.25 : Not used

19.26 : Sensor over-temperature threshold (KTY 84-130 or PT 100)

Adjustment range : 0 to 200°C
Factory setting : 150°C
Format : 16-bit
Used to set the temperature threshold corresponding to triggering a trip selected by **19.36.**

19.27 : Output relay 3 invert

Adjustment range : No (0) or Yes (1)
Factory setting : No (0)
Format : 8-bit
This parameter is used to invert the relay state.

Not (0): not inverted.

Yes (1): inverted.

19.28 : Not used

19.29 : Temperature sensor type

Adjustment range : PT100 (0) or KTY 84(1)
Factory setting : KTY 84(1)
Format : 8-bit
This parameter is used to define the type of sensor connected.

19.30 : DO2 digital output source

Adjustment range : **00.00** to **21.51**
Factory setting : **06.44 Allow cooling fan switch-off**
Format : 16-bit
This parameter is used to select the source for the digital relay output.
Any «bit» type parameter can be assigned. If an unsuitable parameter is addressed, no assignment is taken into account.

19.31 : Not used

19.32 : DI6 input destination

Adjustment range : **00.00** to **21.51**
Factory setting : **00.00**
Format : 16-bit
This parameter is used to select the digital input destination.

19.33 : DI7 input destination

Adjustment range : **00.00** to **21.51**
Factory setting : **00.00**
Format : 16-bit
This parameter is used to select the digital input destination.

19.34 and 19.35 : Not used

19.36 : Sensor over-temperature destination (KTY 84-130 or PT 100)

Adjustment range : **00.00** to **21.51**
Factory setting : **00.00**
Format : 16-bit
To generate a trip, configure the destination with a value likely to cause a user trip.
For example: **19.36 = 10.61 User trip 1**

19.37 : Output relay 3 source

Adjustment range : **00.00** to **21.51**
Factory setting : **06.44 Allow cooling fan switch-off**
Format : 16-bit
This parameter is used to select the source for output relay 3. Any « bit » type parameter can be assigned. If an unsuitable parameter is addressed, no assignment is taken into account.

19.38 : Not used

19.39 : Analog input AI4 level

Adjustment range : ±100.00 %
Format : 16-bit
Indicates as a percentage the signal level on the analog input.

19.40 : Analog input 4 filter

Adjustment range : None (0), 4 ms (1), 8 ms (2), 16 ms(3), 32 ms (4).
Factory setting : 8 ms (2)
Format : 8-bit

None (0):

No filtering is applied to analog input AI4.

4 ms (1) to 32 ms (4):

Used to set the filter time constant applied to analog input AI4.

19.41 : AI4 signal type

Adjustment range : 0-20mA (0), 20-0mA (1), 4-20mA with detection (2), 20-4mA with detection (3), 4-20mA without detection (4), 20-4mA without detection (5), 0-10V (6), +/- 10V (7)
Factory setting : 0-10V (6)
Format : 8-bit
Used to define the type of signal connected to analog input AI4.

19.42 : AI4 current loop

Adjustment range : Active (0) or Lost (1)
Format : 8-bit
In 4-20 mA or 20-4 mA current mode with or without detection, this parameter changes to «1» when the analog signal drops below 3mA.

19.43 : Analog input AI4 scaling

Adjustment range : 0 to 2.50
Factory setting : 1.00
Format : 16-bit
Used to supply the destination parameter with a numerical value in proportion with the input.
However, in the majority of cases, this setting is not necessary since the input is automatically scaled, meaning that 100% as an input corresponds to the maximum value of the destination parameter selected in **19.45**.

19.44 : Analog input AI4 inversion

Adjustment range : No (0) or Yes (1)
Factory setting : No (0)
Format : 8-bit
Used to invert the input signal.

No (0): Input signal not inverted.

Yes (1): Input signal inverted.

19.45 : Analog input 4 destination

Adjustment range : **00.00** to **21.51**
Factory setting : **00.00**
Format : 16-bit
This parameter should contain the number of the parameter which you wish to assign to analog input AI4.
Only numerical parameters can be assigned. If an unsuitable parameter is programmed, no assignment will be taken into account.

19.46 and 19.47 : Not used

19.48 : AO3 analog output 1 source

Adjustment range : **00.00** to **21.51**
Factory setting : **00.00**
Format : 16-bit
This parameter is used to select the source which you wish to assign to analog output AO3.

19.49 : Analog output AO3 scaling

Adjustment range : 0 to 60.000
Factory setting : 1.000
Format : 16-bit
Used to provide a numerical value in proportion with the source parameter as an output. However, in the majority of cases, this setting is not necessary since the output is automatically scaled, meaning that 100% as an output corresponds to the maximum value of parameter **19.48**.

19.50 : Analog output AO3 level

Adjustment range : ±100.00 %
Format : 16-bit
Indicates as a percentage the analog output level, before conversion into a +/-10V, 0-20mA or 4-20mA signal according to the selection made by **19.52**.

19.51 : Analog output 3 filter

Adjustment range : None (0), 4 ms (1), 8 ms (2), 16 ms (3), 32 ms (4).
Factory setting : 8 ms (2)
Format : 8-bit

None (0):

No filtering is applied to analog output AO3.

4 ms (1) to 32 ms (4):

Used to set the filter time constant applied to analog output AO3.

19.52 : AO3 analog output mode

Adjustment range : +/-10V (0), 0-20mA (1), 4-20mA (2)
Factory setting : 4-20mA (2)
Format : 8-bit
Used to choose the type of output signal.

+/- 10V (0):

+/-10V voltage output.

0 - 20mA (1):

0 to 20 mA current output.

4 - 20mA (2):

4 to 20 mA current output.

19.53 : AO2 analog output 1 source

Adjustment range : **00.00** to **21.51**
Factory setting : **00.00**
Format : 16-bit
This parameter is used to select the source which you wish to assign to analog output AO2.

19.54 : Analog output AO2 scaling

Adjustment range : 0 to 60.000
Factory setting : 1.000
Format : 16-bit
Used to provide a numerical value in proportion with the source parameter as an output. However, in the majority of cases, this setting is not necessary since the output is automatically scaled, meaning that 100% as an output corresponds to the maximum value of the source parameter selected in **19.53**.

19.55 : Analog output AO2 level

Adjustment range : ±100.,00 %
Format : 16-bit
Indicates as a percentage the analog output level, before conversion into a +/-10V, 0-20mA or 4-20mA signal according to the selection made by **19.57**.

19.56 : Analog output 2 filter

Adjustment range : None (0), 4 ms (1), 8 ms (2), 16 ms (3), 32 ms (4).
Factory setting : 8 ms (2)
Format : 8-bit

None (0):

No filtering is applied to analog output AO2.

4 ms (1) to 32 ms (4):

Used to set the filter time constant applied to analog output AO2.

19.57 : AO2 analog output mode

Adjustment range : +/-10V (0), 0-20mA (1), 4-20mA (2)
Factory setting : 4-20mA (2)
Format : 8-bit
Used to choose the type of output signal.

+/- 10V (0):

+/-10V voltage output.

0 - 20mA (1):

0 to 20 mA current output.

4 - 20mA (2):

4 to 20 mA current output.

19.58 to 19.67 : Not used

19.68 : Factory settings MDX-I/O module

Adjusment range : No (0) or Yes (1)
Factory setting : No (0)
Format : 8-bit
This parameter is used to set all the parameters in menu 19 to their factory configuration. For this setting to take effect, power down and then power up again.

19.69 : MDX-I/O module reset

Reserved.

19.70 to 19.99 : Not used

5 - DIAGNOSTICS

No.	Trip name	Cause	Remedies
51	DO2 MDX-I/O overload	The DO2 output load current is > 200mA	Check that DO2 is not short-circuited
53	MDX-I/O serial link	Communication problem between the drive and the MDX-I/O LITE option	Check the MDX-I/O LITE mounting
69	24V MDX-I/O overload	The 24V load current is too high	Check the MDX-I/O LITE option I/O wiring
70	4mA loss on AI4	Loss of the current reference on analog input AI4	Check the wiring and input source of the MDX-I/O LITE option

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LEROY-SOMER™

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Limited company with capital of 65,800,512 €
RCS Angoulême 338 567 258

www.leroy-somer.com