

# LULC031

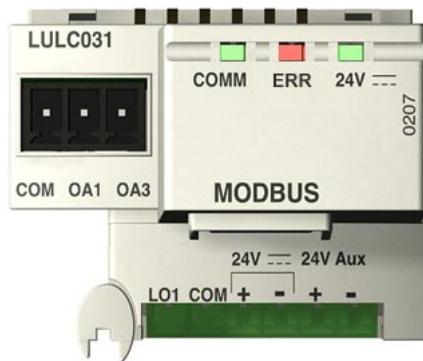
## Telemecanique

Guide d'exploitation  
User's manual  
Bedienungsanleitung  
Guía de explotación  
Guida all'impiego

**05-2003**

Module de communication LULC031,  
LULC031 communication module,  
Kommunikationsmodul LULC031  
Módulo de comunicación LULC031  
Modulo di comunicazione LULC031

N° de version logicielle : 2.3  
Firmware revision: 2.3  
Softwareversionsnummer: 2.3  
N° de versión programa: 2.3  
N° di versione programma: 2.3



**Merlin Gerin**

**Modicon**

**Square D**

**Telemecanique**

**Schneider**  
 **Electric**



## Table of Contents

	Page
<b>1</b>	<b>Introduction</b> .....24
<b>2</b>	<b>Description</b> .....25
<b>3</b>	<b>Installation</b> .....26
<b>4</b>	<b>Control connections</b> .....27
<b>4-1</b>	<b>Network connections via an RS485 link</b> .....27
4-1-1	RJ45 connector pin-out .....27
4-1-2	Connection schematics (PLC <=> RJ45).....27
4-1-3	Connection to the SCA type units .....28
4-1-4	Connection topology.....28
<b>4-2</b>	<b>Examples of electrical diagrams</b> .....29
4-2-1	Association with an LUCA/B/C/D control unit.....29
4-2-2	Association with an LUCM multifunction control unit.....29
<b>5</b>	<b>Operation</b> .....30
<b>5-1</b>	<b>To address and identify the control unit</b> .....30
<b>5-2</b>	<b>Implementation</b> .....30
5-2-1	Programming example on a Micro or Premium TSX platform.....31
5-2-2	Contingency modes if communication with the PLC is lost.....32
5-2-3	Command for the programmable output LO1 .....32
5-2-4	The registers .....32
5-2-4-1	The read/write zones.....32
5-2-4-2	List of registers that can be read/write accessed in association with a LUCA/B/C/D control unit .....33
5-2-4-3	List of registers that can be read/write accessed in association with an LUCM multifunction control unit.....37
<b>5-3</b>	<b>Schematic diagram</b> .....40
<b>5-4</b>	<b>Description of the faults</b> .....40
<b>6</b>	<b>Technical characteristics</b> .....41
<b>7</b>	<b>Connection capacities</b> .....41

# LULC031 communication module

ENGLISH

## 1 Introduction

The **LULC031** communication module can be used to connect the TeSys® model U starter unit to the Modbus® network.

For further information about the Modbus® protocol, please see the reference WEB site at the following address: [www.Modbus.org](http://www.Modbus.org).

The protection and control information available depends on the control unit to which the module is associated.

The module enables the following information and commands to be remotely accessed:

Control units	standard LUCA	advanced LUCB/CC/CD	multifunction LUCM
States (ready, running, fault)			
Alarm			
Remote reset via the bus			
Motor load indication			
Fault differentiation			
Remote configuration and consultation of all the functions			
"Log" function			
"Monitoring" function			
On and off commands			

The **LULC031** module must only be used with LUC... BL control units (24V DC).

**⚠ WARNING**

**Improper communication port usage**

- Use communication ports for transfer of non-critical data only,
- The data provided by monitoring contactor status and current levels is delayed by transmission time. Do not use this data for critical control decisions.
- Verify function settings before starting the motor.
- Do not use functions such as Run, Stop and Reverse for emergency or critical control applications.

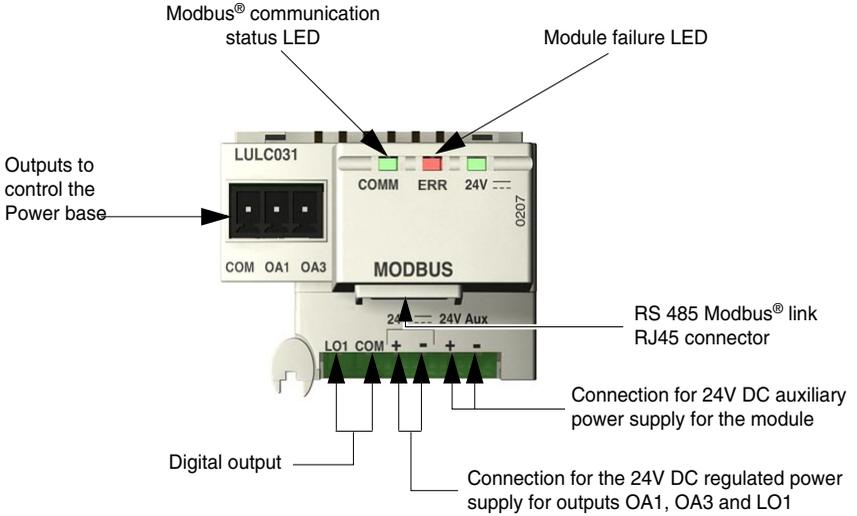
**Improper use of Communication Ports can result in death, serious injury, or equipment damage.**

# LULC031 communication module

## 2 Description

For the module to operate, power must be supplied via a 24V DC auxiliary source.

For local control requirements, the **LULC031** module incorporates a digital output 0.5A/24V DC.



Green "COM" LED	Flashing	Module is initializing or exchanging frames on the bus
Red "ERR" LED	Flashing alone	Communication fault not acknowledged
	Flashing (alternately with the "COM" LED)	Bus parameters are being initialized
	On	Internal module fault
Green "24V =" LED	On	--- 24 V voltage present on outputs OA1, OA3 and LO1

## 3 Installation

The Modbus® **LULC031** communication module is easily installed in the power base (**LUB../LUS..** or **LU2B../LU2S..**) under the **LUC...BL** control unit that locks it into position.

It must be assembled in the following order:

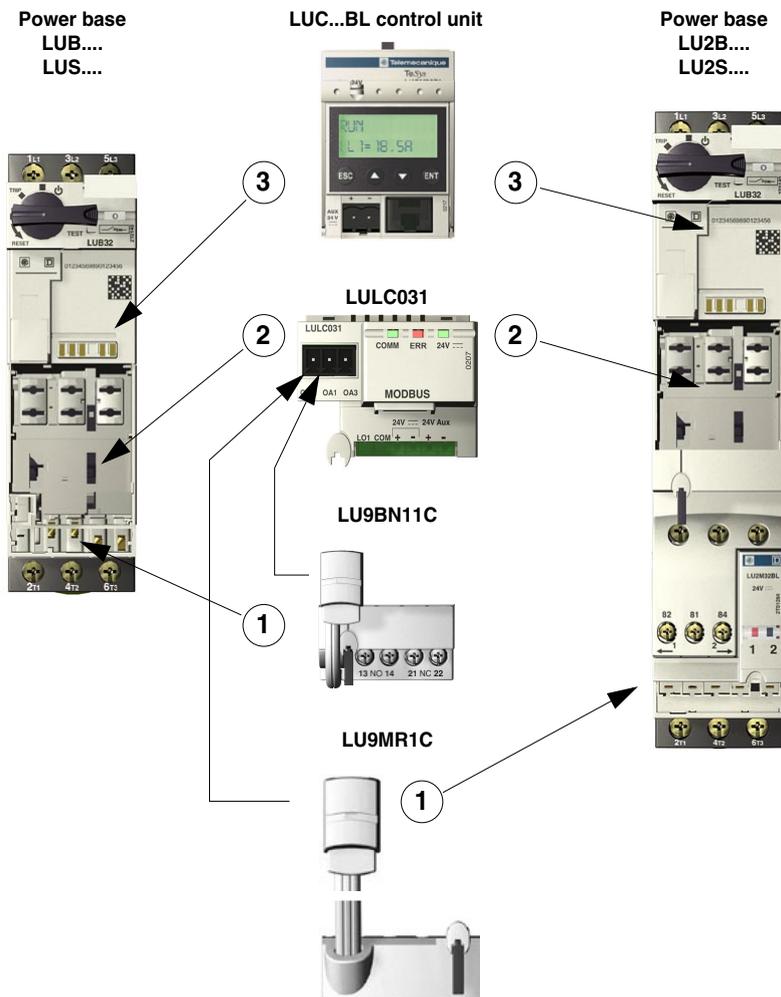
- 1) The starter control connector can be connected by wire using **LU9BN11C** cable (for **LUB../LUS..**) or **LU9MR1C** cable (for **LU2B../LU2S..**).

**NOTE:** Direct wiring can be used, for example, to insert external stop control or a voltage interface.

- 2) install the Modbus® **LULC031** communication module.

- 3) install the **LUC...BL** control unit,

**NOTE:** The control unit must be 24V DC



# LULC031 communication module

## 4 Control connections

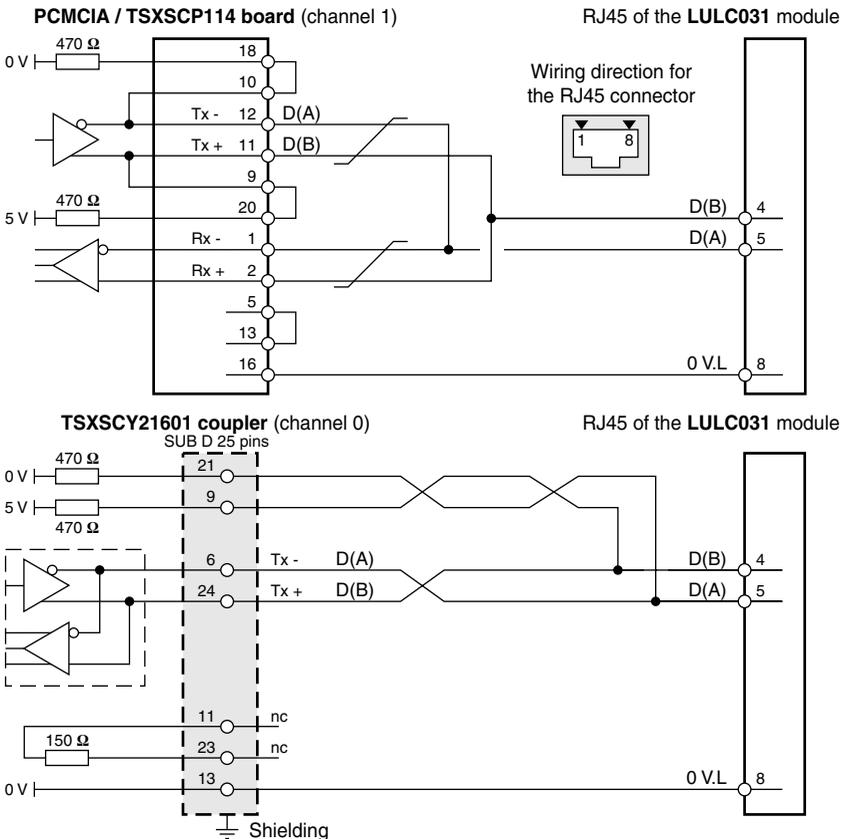
### 4-1 Network connections via an RS485 link

#### 4-1-1 RJ45 connector pin-out

The module is connected to the Modbus<sup>®</sup> network via an RJ45 connector by respecting the following wiring:

RJ45 connector pin-out	Signal	RJ45 connector pin-out	Signal
1	Do not connect	5	D(A)
2	Do not connect	6	Do not connect
3	Do not connect	7	Do not connect
4	D(B)	8	0 V.L

#### 4-1-2 Connection schematics (PLC <=> RJ45)



**NOTE:** ensure that the 470 Ω resistors are connected to the 0 V and 5 V polarities.

**NOTE:** Schneider references for cables used to link the module's RJ45 connector to the coupler:

(coupler)TSX SCP 114 <-----> (cable) TSX SCP CX4030 <-----> RJ45.

(coupler)TSX SCY 21601 <-----> (cable) TSX SCX CM6030 : Stripped wires <-----> RJ45.

# LULC031 communication module

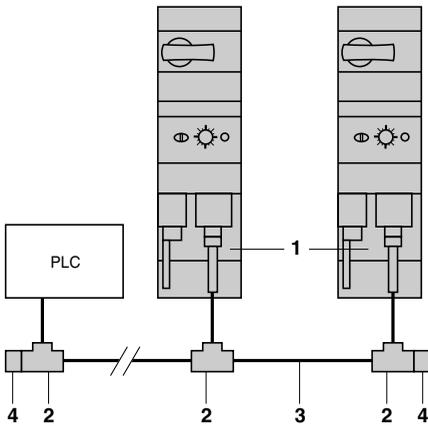
## 4-1-3 Connection to the SCA type units

Unit	Commercial reference	Ends of the cable	
SCA 50	VW3 A8 306 D30	RJ45	Free wires
SCA 62	VW3 A8 306	RJ45	SUBD15

## 4-1-4 Connection topology

Connecting accessories exist, such as:

- **T-couplings:** to connect several LULC031 modules on the bus **LULC031**



1 - LULC031 communication module

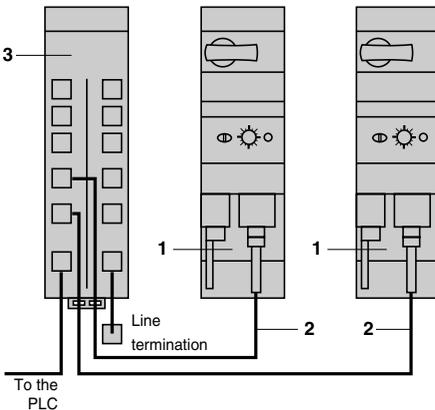
2 - T-coupling VW3A8306TF.

3 - VW3A8306R.. D wire

4 - VW3A8306R line termination

**NOTE:** We recommend placing a line end termination at each end of the bus to avoid malfunctions on the communication bus. This means that a T-coupling must not have a free RJ45 connector. Either it is connected to a slave or the master, or there is a line end termination.

- **Distribution units:** to connect several LULC031 modules in star connection.



1 - LULC031 communication module

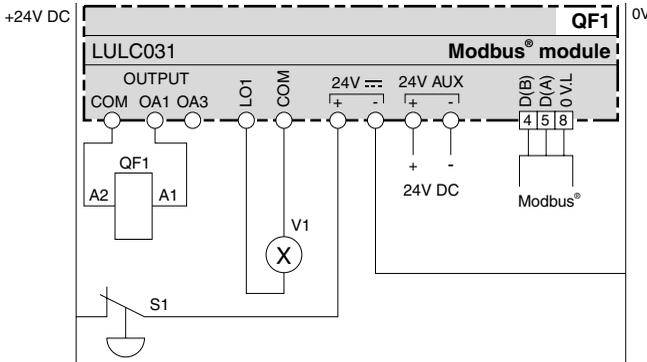
2 - VW3A8306R connection cable with 1 RJ45 connector on each end

3 - LU9GC3 Modbus® distribution unit with channel connection on the PLC side and starter-controller side via RJ45 connectors

# LULC031 communication module

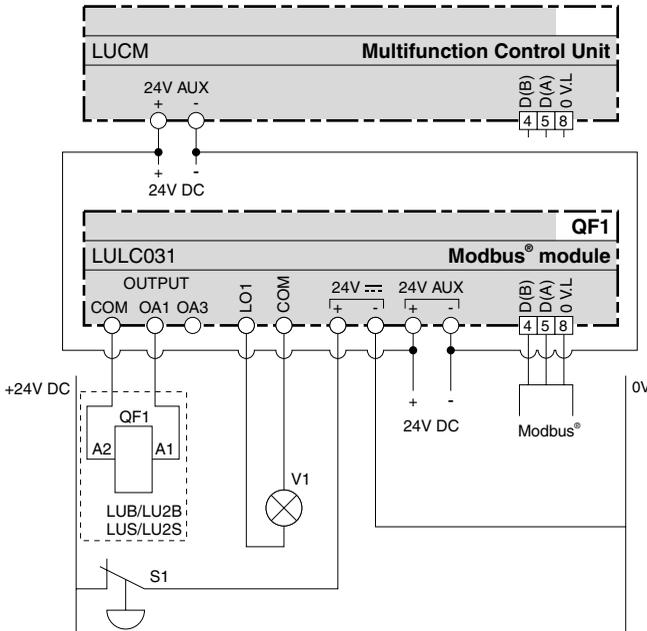
## 4-2 Examples of electrical diagrams

### 4-2-1 Association with an LUCA/B/C/D control unit



Control by Modbus® communication module without coil pre-wiring and with emergency stop

### 4-2-2 Association with an LUCM multifunction control unit



Control by Modbus® communication module without coil pre-wiring and with emergency stop

**NOTE:** 24V DC auxiliary power supplies are compulsory for fault-free operation.

## 5 Operation

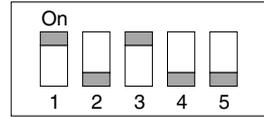
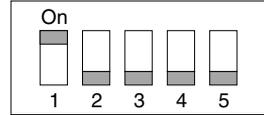
### 5-1 To address and identify the control unit

The Modbus® communication module address is defined by the micro switches which can be accessed in the lower part of the module.

Values from 1 to 31 are accepted.

Address encoding is in binary with the least significant bit on the left.

The module is supplied factory-set with address 1. Address 0 (used by the Master for a broadcast request) is not taken into account by the module.



Ex : address 5

Register 690 is used to identify the control unit that is present.

This register is read/write accessible and can contain 3 values written by the user:

- **Value 0** ==> Auto-identification function (by default). The **LULC031** module **automatically** identifies the type of control unit at power up,
- **Value 1** ==> The control unit is the "standard" type (LUCA) or "upgradable" (LUCB/C/D),
- **Value 2** ==> The control unit is the "multifunction" type (LUCM),

Addressing is only taken into account when the communication module is switched on to the power supply.

### 5-2 Implementation

Communication is based on Modbus® RTU slave protocol.

- **The data format is the following:**

1 start bit                      8 data bits                      1 parity bit                      1 stop bit

- 1) When 24V DC aux is supplied, the **LULC031** module initializes
- 2) At the end of the initialization phase, the **LULC031** module will automatically identify the configuration parameters for the RS 485 link. To do this, a certain amount of traffic is obviously required on the network. The **LULC031** module recognizes the speed and parity of the Master after analyzing a maximum of 40 frames for the lowest speed (1200 baud).

- **The magnitudes recognized are:**

- **Speed:** 1200, 2400, 4800, 9600 and 19200 baud
- **Parity:** even, odd, no parity (parity bit deleted).

**NOTE:** These parameters are factory preset to 19200 baud, no parity and 1 bit stop.

- **The recognized Modbus® requests are:**

- Code 03 (03 hex) (read multiple register),
- Code 06 (06 hex) (write single register),
- Code 16 (10 hex) (write multiple register).
- Code 43 (2B hex) (read device identification) to identify the module.

**NOTE:** The "Broadcast" function is supported for request codes 06 and 16 using address 00.

- **The "exception" codes supported are:**

- Code 01 - Illegal function,
- Code 02 - Illegal data address,
- Code 03 - Illegal data value (write command not completed).

# LULC031 communication module

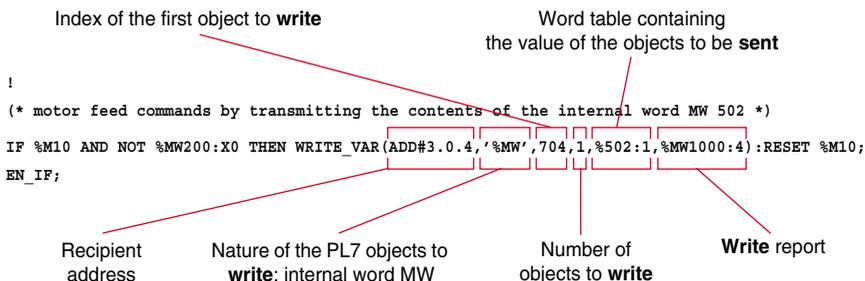
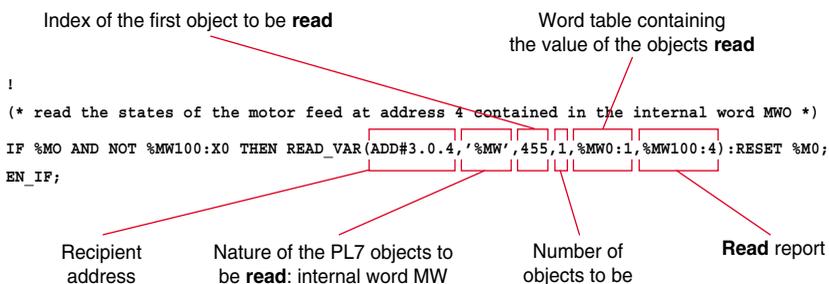
**NOTE:** The detailed format of these requests is explained on the site [www.Modbus.org](http://www.Modbus.org)

**NOTE:** When combined with the LUCM multifunction control unit, you must ensure that you do not supply 24V DC power to the **LULC031** module before supplying 24V DC power to LUCM control unit. Otherwise, a communication fault will be generated at the **LULC031** module (red LED On). This fault can only be cancelled by turning the **LULC031** module off.

## 5-2-1 Programming example on a Micro or Premium TSX platform

The applications for Micro and Premium logic controllers are designed and implemented using PL7 software.

The READ\_VAR or WRITE\_VAR requests respectively read or write the value of one or more consecutive objects of the same type (bit, word) in PL7 language.



For more details on programming Modbus® communication on a TSX platform, please refer to the PL7 on-line help, under the heading Communication fields Volume 2/ Communication via Modbus®.

## 5-2-2 Contingency modes if communication with the PLC is lost

The following commands only affect the operation of OA1 and OA3 modes if communication with the PLC is lost.

These contingency modes are selected by writing 1 in the bits of register 682 according to the following allocation:

### Without contingency mode:

- Value 0 ==> Contingency mode disabled (default setting),

### With contingency mode:

- Value 1 ==> Held in same state (outputs OA1 and OA3 remain in the same state as before the loss of communication regardless of the commands written in register 704),
- Value 2 ==> Forced stop,
- Value 3 ==> Unchanged (signals a Time Out fault, the command states in register 704 are copied to outputs OA1 and OA3),
- Value 4 ==> forced running in direction 1 (OA1 output = 1 and OA3 output = 0),
- Value 5 ==> forced running in direction 2 (OA3 output = 1 and OA1 output = 0).

## 5-2-3 Command for the programmable output LO1

It is possible to allocate a "default" command to the digital output of the **LULC031** module. This provides a 'fault' output on the communication module. This is allocated by writing 1 to the bits in register 685.

- Value 0 ==> LO1 port always on 0 (zero),
- Value 1 ==> LO1 port always on 0 1,
- Value 2 ==> No allocation, output LO1 is not used,
- Value 3 ==> A thermal overload fault will cause output LO1 to close (452.3 = 1).
- Value 4 ==> A thermal overload warning will cause output LO1 to close (461.3 = 1).
- Value 5 ==> Rotary button set to the "ready"  position will cause output LO1 to close (457.0 = 1).
- Value 6 ==> The mechanical system tripping (rotary button set to the "Trip" position) due to an over-current or short-circuit fault will set output LO1 to 1 (457.1 = 1),
- Value 7 ==> Close down of the power Base poles will cause output LO1 to close (457.2 = 1).

## 5-2-4 The registers

The number and content of the registers that can be accessed differs according to the type of control unit to which the module is associated.

### 5-2-4-1 The read/write zones

**The memory zone from 0 to 19999 can be accessed by the client.**

- Reading the zone of a "Reserved" register (or non-set) causes a correct response (value "0").
- Writing to the zone of a "Reserved" register causes a correct response (value "0").

**NOTE:** *The write operation is not taken into account and the contents remain equal to (0).*

- Writing to the zone of a "Read only" register causes a response with an exception code (code 03).

**The memory zone = 20000 is private and therefore reading/writing is not authorised.**

**NOTE:** *All accesses will be signalled by an exception code (code 02).*

# LULC031 communication module

## 5-2-4-2 List of registers that can be read/write accessed in association with a LUCA/B/C/D control unit

From 50 to 80, identification registers, read only						
16-bit register	Bit	Range	Unit	Default value	LUCA only	Information
50 to 54		ASCII		0	•	Module commercial reference msb = caractere 1 - lsb = caractere 2 msb = caractere 3 - lsb = caractere 4 msb = caractere 5 - lsb = caractere 6 msb = caractere 7 - lsb = caractere 8 msb = caractere 9 - lsb = caractere 10
61		0 - 149		0	•	Module identification code (LULC031 module = 100)
62		0-65535		0	•	Module firmware revision x100 (example: the value 100 corresponds to version V1.0)
63		0-65535		0	•	Module parameter compatibility version x100
75						Identification register:
	2	0 - 1	Off/On	0		Control unit LUCA/B/C/D
	4	0 - 1	Off/On	0		Multifunction control unit LUCM

From 451 to 473, command registers, read only						
16-bit register	Bit	Range	Unit	Default value	LUCA only	Information
451		0-65535	None	0	•	Fault number register*
<b>Description of the fault (register 451)</b>						
Short-circuit fault						1
Magnetic fault						2
Thermal overload fault						4
Control unit internal fault						54
<b>LULC031</b> Module internal fault						100, 101, 102, 104
<b>LULC031</b> Module loss of communication						109
452	0	0 - 1	Off/On	0		Short-circuit fault
	1	0 - 1	Off/On	0		Magnetic fault
	2	0 - 1	Off/On	0		Reserved
	3	0 - 1	Off/On	0		Thermal overload fault
	4 to 10	0 - 1	Off/On	0		Reserved
	11	0 - 1	Off/On	0		Control unit internal fault
	12	0 - 1	Off/On	0		Reserved

From 451 to 473, command registers, read only						
16-bit register	Bit	Range	Unit	Default value	LUCA only	Information
(452)	13	0 - 1	Off/On	0		Module internal fault
	14	0 - 1	Off/On	0		Reserved
	15	0 - 1	Off/On	0		Reserved
455	0	0 - 1	Off/On	0	•	Ready. Rotary knob set to  and no fault.
	1	0 - 1	Off/On	0	•	On (= 1 contactor switched on)
	2	0 - 1	Off/On	0	•	Fault (overload , magnetic, short-circuit, internal fault)
	3	0 - 1	Off/On	0	•	Alarm (thermal overload and loss of communication)
	4	0 - 1	Off/On	0	•	Tripped (Rotary handle = "Trip")
	5	0 - 1	Off/On	0	•	Reset authorized
	6	0 - 1	Off/On	0	•	Reserved
	7	0 - 1	Off/On	0		Reserved
	8 to 13	0-63	3.125 %IR	0	LUCB LUCD	Motor current on 6 bits 455.8 lsb 455.13 msb The value 32 is 100 % of I average/FLA
0				LUCC	Motor current on 6 bits 455.8 lsb 455.13 msb The value 21 is 100 % of I average/FLA	
14 à 15	0 - 1	Off/On	0		Reserved	

**NOTE:** The information in register 455 is the result of logic equations that consider the mechanical states of the starter and the internal logic information (fault, running...)

457	0	0 - 1	Off/On	0	•	Rotary handle = ON 
	1	0 - 1	Off/On	0	•	Rotary handle = "Trip"
	2	0 - 1	Off/On	0	•	State of the power terminals
	3	0 - 1	Off/On	0	•	Vout powered, 24 V DC --- voltage present on the outputs
	4 to 15	0 - 1	Off/On	0	•	Reserved

**NOTE:** The information in register 457 (bits 0 to2) corresponds to the mechanical states of the starter. Hence, bits 0 and 1 reflect the position of the rotary knob, while bit 2 corresponds to the logic information of the NO contact 13-14.

460		0-65535	None	0		Warning number = 4 thermal overload, = 109 loss of communication on external ModBus port
-----	--	---------	------	---	--	------------------------------------------------------------------------------------------------

From 451 to 473, command registers, read only						
16-bit register	Bit	Range	Unit	Default value	LUCA only	Information
461	0 to 2	0 - 1	Off/On	0		Reserved
	3	0 - 1	Off/On	0		Thermal overload warning
	4 to 15	0 - 1	Off/On	0		Reserved
466		0-200	%IR			I AV average current (accuracy ≤ 10%)
<b>NOTA :</b> (register 466) With an LUCC single-phase advanced control unit, the value 67% corresponds to nominal motor I instead of 100% in three-phase.						
473		0-65535	None			Checksum value of the module configuration

602, configuration register, read and write accessible if the starter is stopped						
16-bit register	Bit	Range	Unit	Default value	LUCA only	Information
602	0	0 - 1	Off/On	1		Thermal overload failure must be reset manually
	1	0 - 1	Off/On	0		Thermal overload remote reset
	2	0 - 1	Off/On	0		Thermal overload fault auto reset
	3 to 15	0 - 1	Off/On	0		Reserved

From 681 to 690, setting registers, read/write accessible						
16-bit register	Value	Range	Unit	Default value	LUCA only	Information
<b>Timeout on loss of external communication</b>						
681		0-65535	None	6000	•	Time out (time base 10 ms) <b>NOTE:</b> The zero value (0) represents zero time.
<b>Configuration du mode de repli en cas de perte de communication externe</b>						
682	0	0-65535	None	0	•	Contingency mode disabled
	1	0-65535	None		•	Outputs held is same state
	2	0-65535	None		•	OA1 and OA3 outputs forced to 0
	3	0-65535	None		•	Outputs OA1 and OA3 unchanged, signalling that a loss of communication exists
	4	0-65535	None		•	OA1 output forced to 1
	5	0-65535	None		•	OA3 output forced to 1

From 681 to 690, setting registers, read/write accessible						
16-bit register	Value	Range	Unit	Default value	LUCA only	Information
<b>Allocation and control of output LO1</b>						
685	0	0-65535	None	0		LO1 output forced to 0 V
	1	0-65535	None			LO1 output forced to 24 V
	2	0-65535	None			Image print out of the 700 register status
	3	0-65535	None			Thermal overload fault
	4	0-65535	None			Thermal overload warning
	5	0-65535	None			Rotary handle = ON 
	6	0-65535	None			Rotary handle = "Trip"
	7	0-65535	None			Power Base poles state
<b>Identification of the control unit type</b>						
690	0	0-65535	None	0		Auto-identification of the control unit type
	1	0-65535	None			Standard control unit LUCA Upgradable control unit LUCB/CC/CD
	2	0-65535	None			Multifunction control unit LUCM

From 700 to 705, command registers, read/write accessible						
16-bit register	Bit	Range	Unit	Default value	LUCA only	Information
700		0-65535	None	0	•	LO1 output (if 685 = 2)
701		0-65535	None	0		Reserved
702		0-65535	None	0		Reserved
703	3			0	•	Alarm acknowledgement if communication is lost with the following contingency modes validated: unchanged, forced running in the direct direction, or forced running in the reverse direction, outputs OA1 and OA3 held when [682] = 1, 3, 4 or 5.
704	0			0	•	Run (output OA1)
	1			0	•	Run (output OA3)
	2			0	•	Reserved

From 700 to 705, command registers, read/write accessible						
16-bit register	Bit	Range	Unit	Default value	LUCA only	Information
(704)	3			0		460 = 102 or 104 alarms reset 451 = 102 or 104 faults reset  This action results in the restitution of the LULC031 module's default settings (factory settings) (see 5-4 <i>Description of the faults</i> , page 20)
				0	•	Loss communication fault reset (if 682 = 2) Reset
	4 to 15			•	Reserved	
705	0	0 - 1	Off/On	0	•	Return parameters to default value (factory setting).

## 5-2-4-3 List of registers that can be read/write accessed in association with an LUCM multifunction control unit

This control unit satisfies the strictest motor protection requirements.

These protection systems can be adjusted and configured locally via a display/keypad that is incorporated on the front panel and remotely by reading/writing to registers. It processes the following information:

- diagnostics (type of faults, current values,...)
- operating (number of starts, operating time, number and type of trips,...)
- fault log (record the last 5 faults with the motor current at the moment the fault occurred)

This information is provided in registers, the summary of which is the following (*for more details, see the user's manual for the multifunction control unit*).

Identification	Registers 0 ... 99	Words / Bits	Commercial reference, serial number, software version...of the module with the multifunction CU, the CU and the base
	75	Bit 4	Multifunction control unit LUCM

Log	Registers 100 ... 450	Words / Bits	Fault log, Operating log, Log of the last 5 trips
	-	-	-

States	Registers 451 ... 464	Words / Bits	Alarm signalling (bits) Fault signalling (bits)
	451	Word	Default n°
	452	Bit 0	Short-circuit fault
		Bit 1	Magnetic fault
		Bit 2	Thermal overload fault
		Bit 3 to Bit 15	(see the operating manual for the multifunction control unit LUCM)
	455	Bit 0	Ready. Rotary knob set to
		Bit 1	Power poles closed
		Bit 2	Fault
		Bit 3	Alarm
		Bit 4	Reserved
		Bit 5	Reset no allowed
		Bit 6	Reserved
		Bit 7	Reserved
		Bit 8	Motor current % (bit 0)
		Bit 9	Motor current % (bit 1)
		Bit 10	Motor current % (bit 2)
		(455)	Bit 11
	Bit 12		Motor current % (bit 4)
	Bit 13		Motor current % (bit 5)
	Bit 14		Reserved
	Bit 15		Run start
	460	word	Warning number
	461	Bit 3	Thermal overload warning

Values	Registers 465 ... 471	Words	left for phase1, phase 2, phase3 motor load, thermal state, earth leakage current, phase unbalance and phase missing
	465	word	Thermal capacity
	466	word	(Im/Ir) motor load

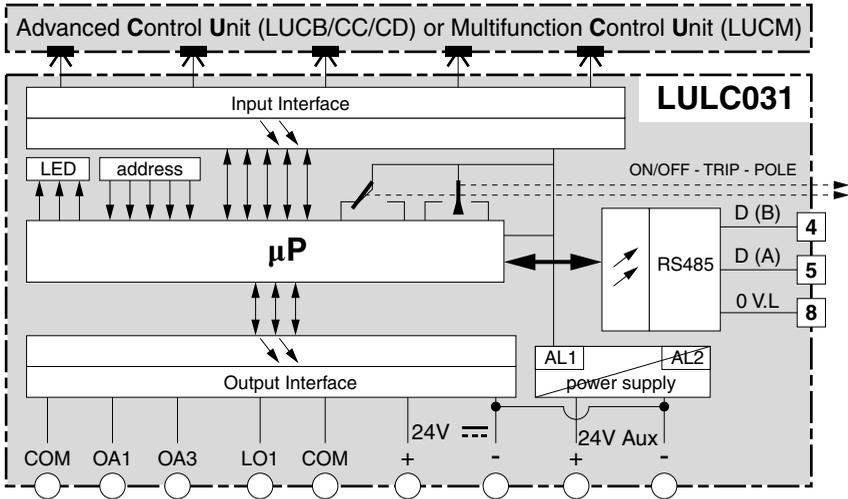
	Registers 472 ... 599	Words / Bits	Reserved
	-	-	-

Configuration	Registers 600 ... 699	Words / Bits	Protection and alarm thresholds, contingency mode and rearming mode
	601	Bit 2	Power Base type (only significant when one of the bits 3 to 6 is set)
		Bit 3	= 1 Base size 12A LUB12
		Bit 4	= 1 Base size 32A LUB32
		Bit 13	3 phases load
		Bit 14	A phase load
		Bit 15	Aux fan cooled
	602	Bit 0	Reset mode-manual
		Bit 1	Thermal overload remote reset
		Bit 2	Thermal overload fault auto reset
		Bit 3 to Bit 15	(see the operating manual for the multifunction control unit LUCM)
	681	<b>Value</b>	(see page 15)
	682	<b>Value</b>	(see page 15)
	685	<b>Value</b>	(see page 16)
	690	<b>Value</b>	(see page 16)

Commands	Registers 700 ... 714	Words / Bits	Commands
	700	Bit 0	LO1 output (if 685 = 2)
	703	Bit 3	Alarm acknowledgement "LULC031 Module loss of communication"
	704	Bit 0	OA1 output
		Bit 1	OA3 output
		Bit 2	Reserved
		Bit 3	460 = 102 or 104 alarms reset 451 = 102 or 104 faults reset (see 5-4 <b>Description of the faults</b> , page 20)
		Bit 4	Reserved
		Bit 5	Trip test
		Bit 6 to 15	Reserved

# LULC031 communication module

## 5-3 Schematic diagram



ENGLISH

## 5-4 Description of the faults

Fault	Causes	Corrective actions
Green "24V ---" LED off	24V DC power missing on the 24V --- terminal	Check the connection between the power supply and the module
Red "ERR" LED permanently on	Internal <b>LULC031</b> module faults	<p>If register 451 = 102 or 104 :                      ==&gt; acknowledgement by setting bit 704.3 to 1</p> <p> This action results in the restitution of the LULC031 module's default settings (factory settings) in respect of the following parameters :</p> <ul style="list-style-type: none"> <li>- Bus speed and parity,</li> <li>- Setting registers 681 to 690</li> </ul> <p>-----</p> <p>If register 451 ≠ 102 or 104 :                      ==&gt; cycle the <b>LULC031</b> module off and on.</p>
Red "ERR" LED flashing	Loss of communications on the Modbus® network	<p>If register 682=2 :                      ==&gt; acknowledgement by setting bit 704.3 to 1</p> <p>If register 682=1,3 ,4 ou 5 :                      ==&gt; acknowledgement by setting bit 703.3 to 1</p>

## 6 Technical characteristics

Physical interface		RS 485
Protocol		Modbus® RTU
Max transmission speed	Bit/s	Auto-configuration up to 19200
Maximum clear-to-send delay for a request	ms	10 with LUCA/B/C/D control units 200 with LUCM control unit
Addressing		Via switches: from 1 to 31
Ambient air temperature	°C	For operation -25...+55
Power supply for the outputs	V	24 DC
Current consumed on the auxiliary 24V DC	mA	Limited to 500
Number of outputs		3 including 2 dedicated to controlling the windings of the starter-controller
Commutation capacity of the outputs		0.5A / 24V
Accuracy on the Im/Ir values		≤ 10%

**NOTE:** The clear-to-send delay corresponds to the time between the end of the question from the Master and the beginning of the response from the **LULC031** module.

## 7 Connection capacities

<b>Connectors</b> <b>3 and 6 Pins - pitch: 3.81</b> <b>Starter control and monitoring</b>	
<p><b>Connection: 1 connector</b></p> <ul style="list-style-type: none"> <li>- rigid conductor: ..... 0.14 to 1 mm<sup>2</sup></li> <li>- flexible conductor: ..... 0.14 to 1 mm<sup>2</sup></li> <li>- conductor size: ..... AWG 28 to AWG 16</li> <li>- flexible conductor with terminal end:                             <ul style="list-style-type: none"> <li>- without insulated ferrule: ..... 0.25 to 1. mm<sup>2</sup></li> <li>- with insulated ferrule: ..... 0.25 to 0.5 mm<sup>2</sup></li> </ul> </li> </ul>	
<p><b>Multiple connection:</b> (2 conductors with the same section)</p> <ul style="list-style-type: none"> <li>- 2 rigid conductors: ..... 0.14 to 0.5 mm<sup>2</sup></li> <li>- 2 flexible conductors: ..... 0.14 to 0.75 mm<sup>2</sup></li> <li>- 2 flexible conductors with terminal end:                             <ul style="list-style-type: none"> <li>- without insulated ferrule: ..... 0.25 to 0.34 mm<sup>2</sup></li> <li>- with insulated ferrule: ..... 0.75 mm<sup>2</sup></li> </ul> </li> </ul>	
<b>Tightening torque:</b>	(0.2 / 0.25 N.m) 1.79 / 2.23 Lb-in
<b>Flat-blade screwdriver:</b>	2.5 mm (0.10 in)

