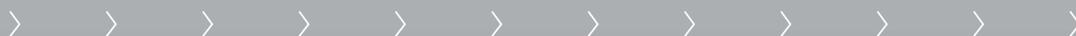**telergon**
gorlan team

Motorised unit
Changeover switch
installation and operation guide

Edition September 2007

gorlan
team

Index

> **Please follow carefully the instructions included in this manual for a correct installation and operation. If you need further information, please contact our Technical Dept.**

Verification of the parts contained in this unit

Before installation ensure that the following parts are included in the carton box:

- Motorised unit **MU** .
- Plastic bag containing screws for fixing the motorised unit to the changeover, and electrical connectors.

- Changeover - motorised unit coupling shaft.
- Manual handle for direct operation.
- User manual.

Safety warnings ⚠

In the installation and during the operation of the motorised unit it is necessary to observe the following recommendations:

- Make sure that the voltage of the motorised unit coincides with the voltage we are going to work with, and the motorised unit is suitable for the changeover that is going to drive *(See annexe 1, page 12)*.
- Before installation ensure that both the changeover and the motorised unit are in 0 (OFF) position.
- Qualified personnel must install the motorised unit.
- Follow carefully the installation instructions and the wiring diagrams.
- The motorised unit must be installed on the changeover switch before being operated. Do not switch the voltage supply until the whole wiring operation has been made.

- Do not dismantle, repair or modify this unit, as it may cause malfunctioning or electrical descharges.
- Do not supply voltage or connect the motorised unit if any of the parts are damaged.
- Take into account possible voltage drops in the wiring. *(See annexe 4, page 16)*.
- Telergón is not responsible for inappropriate use of the motorised unit or the misinterpretation of the information contained in this document.
- The installation of this device in a domestic environment can cause radiofrecuency interference.

> ⚠ *If the secondary line of the changeover switch is a generator set, make sure that the generator set switches off after retransferring the lines (t>1 min.).*

Standards ⚠

- IEC/EN 60947-1 y 3. Low voltage devices. General part and Switch - Disconnectors.
- IEC/EN/UNE 61000-6, Parts 2 y 4. Electromagnetic compatibility in industrial environments, immunity and emission.

- According to European standard 2006/95/CE for Low voltage.
- According to European standard 2004/108/CE of EMC.

This product is under $C\epsilon$ marking

**NOTE:** The content of this document can be modified without previous warning.

Installation / Mounting

Ensure that the voltage of the motorised unit coincides with the voltage we are going to work with, and the motorised unit is suitable for the changeover that is going to drive. *(See annexe 1, page 12)*.
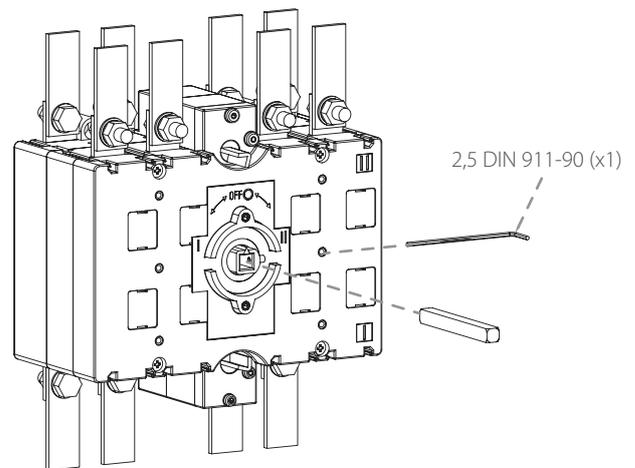
Before installation make sure that both the changeover and the motorised unit are in position 0 (OFF).

The motorised unit must be installed on the changeover switch before being operated following next steps.

FOR CHANGEOVER SERIES CC 200... 1250A
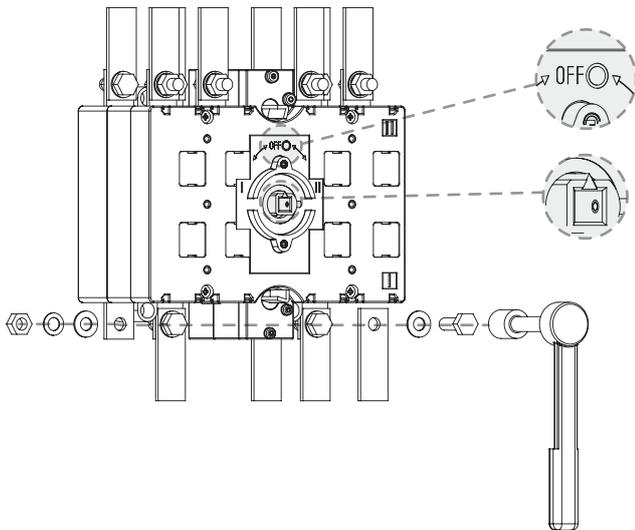
2,5 DIN 911-90 (x1)

① Set the changeover in its place and fix the bars

② Insert the shaft in the changeover and tighten using the supplied spanner (2,5 DIN 911-90 (x1))

A.E.T. 5,3 (x 6)
M5 x 20 DIN7985 (x 6)
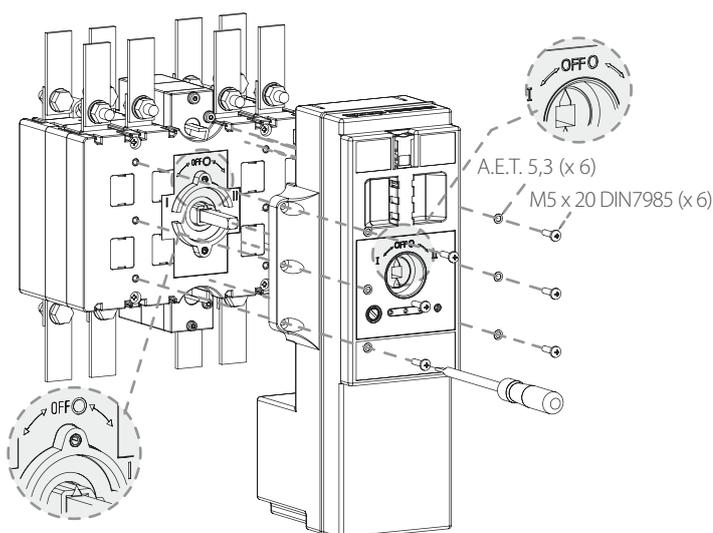
CN1, CN2, CN3, MODBUS

③ Screw the motorised unit (with both changeover and **MU** in position 0). M5x20 DIN7985 screws (x6) and A.E.T. 5,3 washers (x6) included
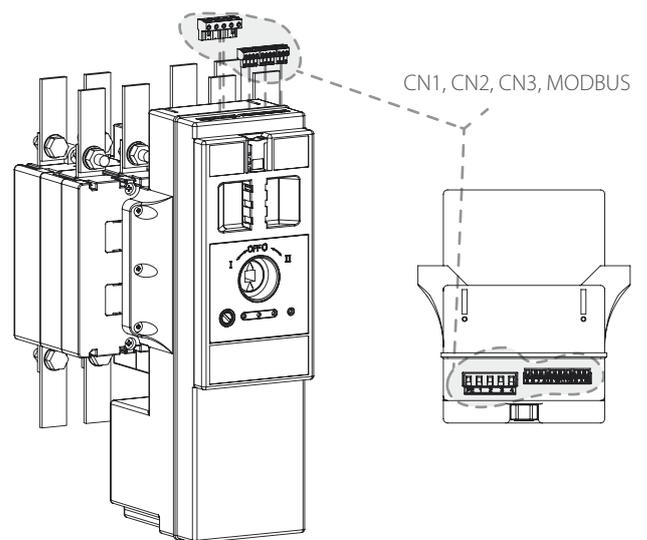
④ Fix connectors (CN1,CN2,CN3,MODBUS) and connect according to the wiring diagram
(See annexe 3, page 15)

FOR CHANGEOVER SERIES S5000F / 1600A - 1800A

A.E.T. 5,3 (x 6)
M5 x 20 DIN7985 (x 6)

SERPRESS M5 (x 6)

(**1**) Set the changeover in its place and fix the bars

(**2**) Screw the motorised unit (with both changeover and **MU** in position 0). M5x20 DIN7985 screws (x6), A.E.T. 5,3 washers (x6) and Serpress M5 nuts (x6) included
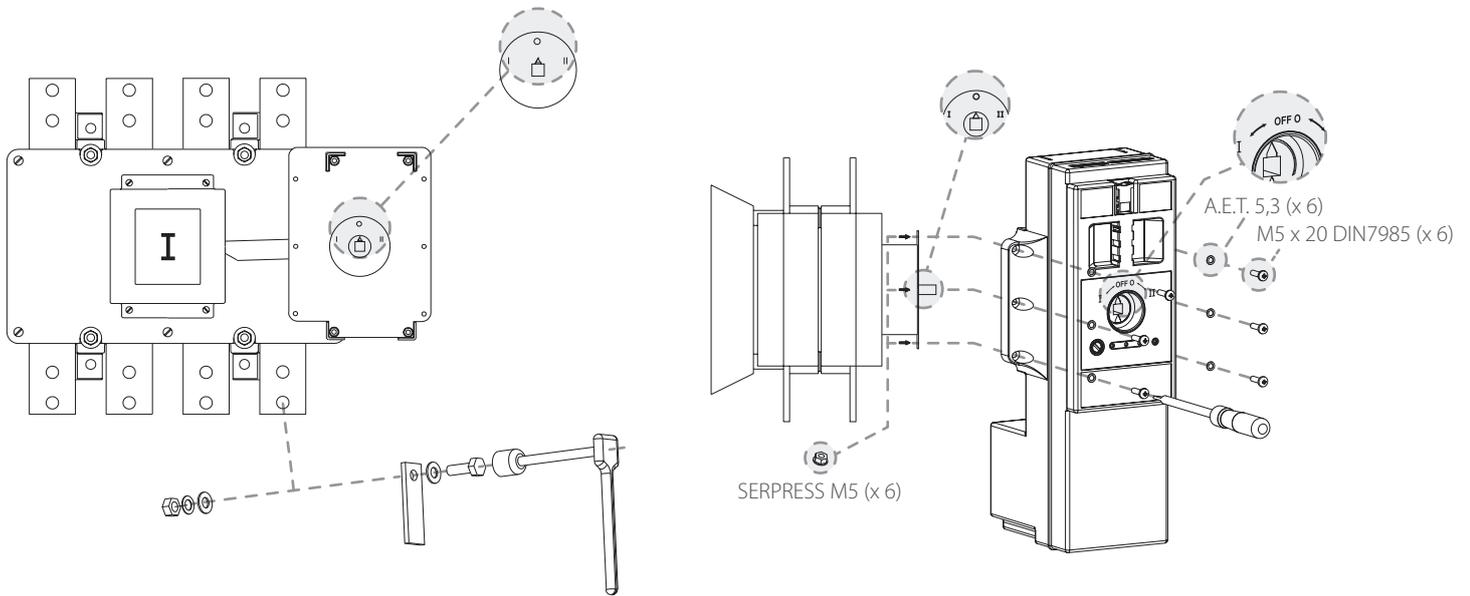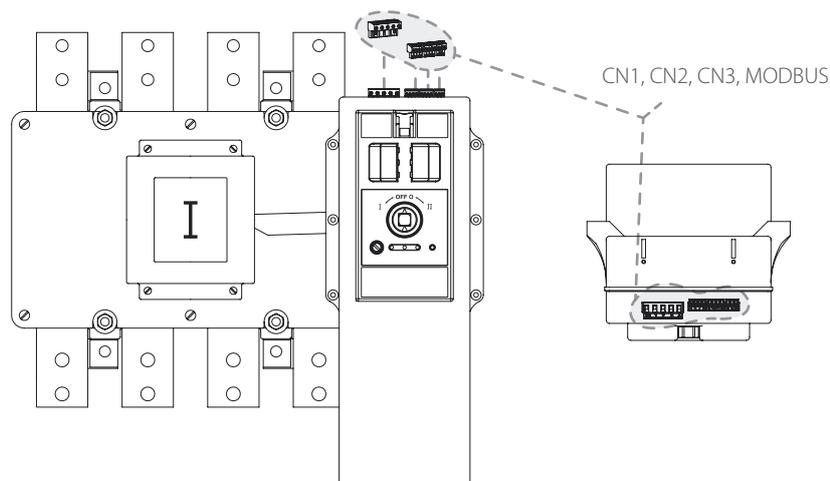

CN1, CN2, CN3, MODBUS

(**3**) Fix connectors (CN1,CN2,CN3,MODBUS) and connect according to the wiring diagram
(See annexe 3, page 15)

Installation / Mounting

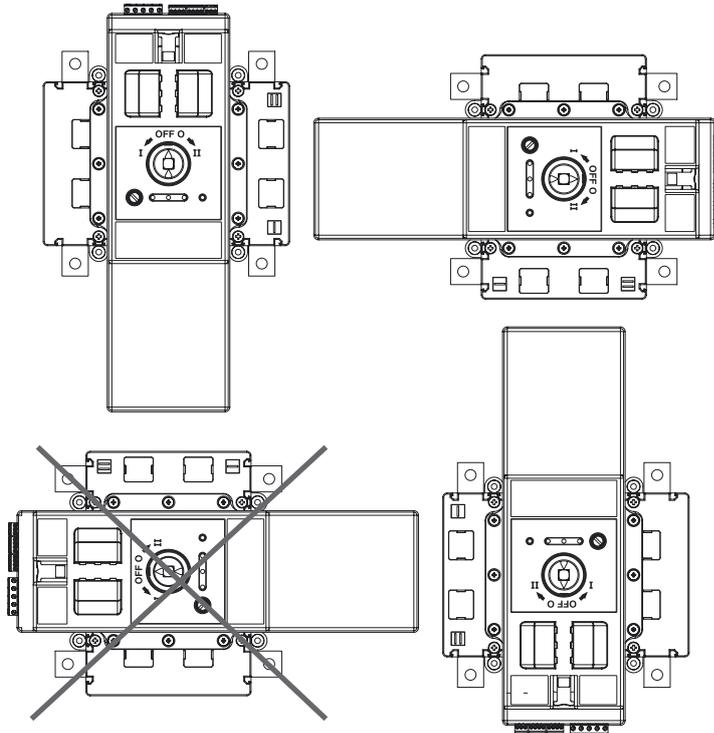The limitations of the motorised unit depend on the changeover mounting position.

CCF

S5000F

* For inverted mountings there are references for motorised units with inverted frontal plates.
Supply under request.
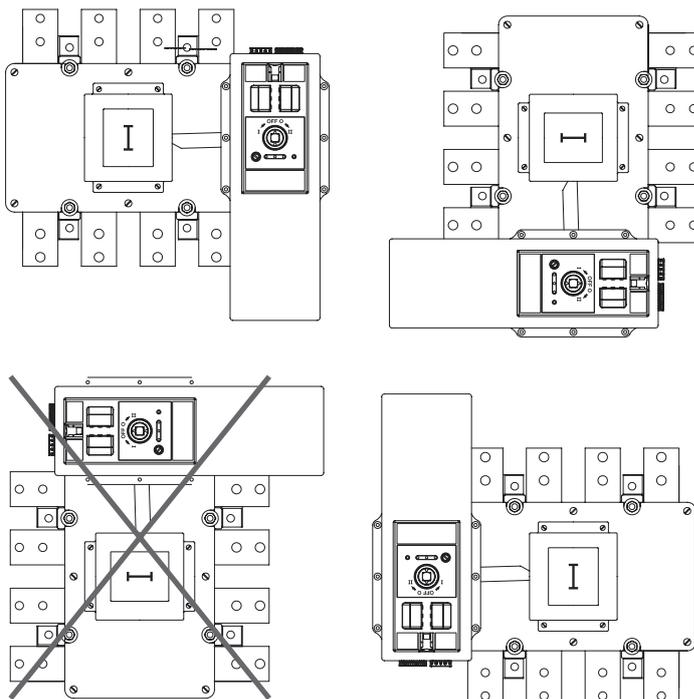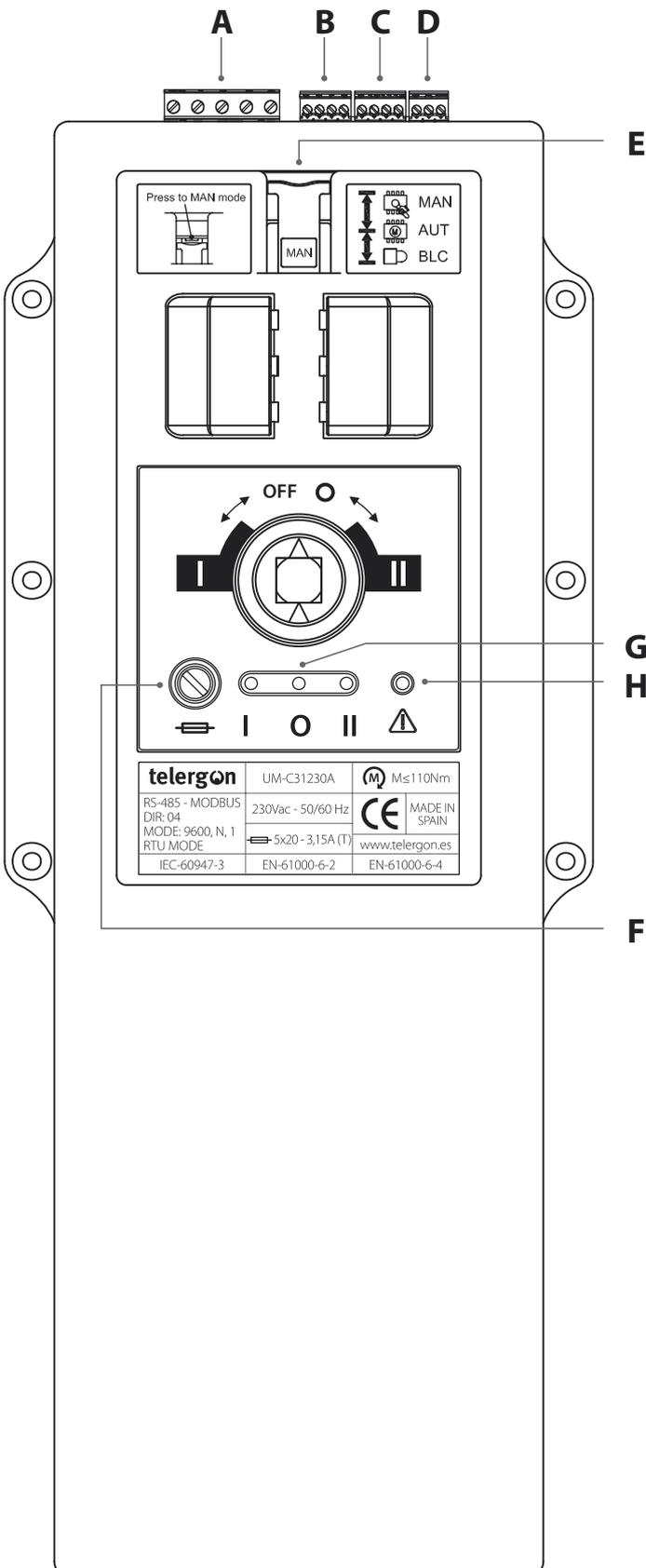
A
Supply voltage

B
Output signals

C
Input signals

D
RS485/MODBUS Communication

E
Operation selector

F
Protection fuse

G
Position Led's

H
Error signals

Press to MAN mode

MAN
AUT
BLC

OFF

I   O   II

telergon   UM-C31230A   M≤110Nm

RS-485 - MODBUS
DIR: 04
MODE: 9600, N, 1
RTU MODE
230Vac - 50/60 Hz
5x20 - 3,15A (T)
MADE IN SPAIN
www.telergon.es

IEC-60947-3   EN-61000-6-2   EN-61000-6-4

Transmission features   Fuse

Code   Motor torque

telergon   UM-C31230A   M≤110Nm

RS-485 - MODBUS
DIR: 04
MODE: 9600, N, 1
RTU MODE
230Vac - 50/60 Hz
5x20 - 3,15A (T)
MADE IN SPAIN
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IEC-60947-3   EN-61000-6-2   EN-61000-6-4

Voltage supply

Product guide

A - VOLTAGE SUPPLY

The motorised unit requires a voltage supply for its operation (terminals 1-2). For the motorised unit to have an uninterrupted supply system (mains-secondary sources), the client shall prepare a circuit similar to the example (*) *at page 15.*

	Terminales
Supply	1-2
Ground connection	PE

Terminal max. capacity: 4 mm² (without clamps) / 2,5 mm² (with clamps).

B - OUTPUT SIGNALS

Indicate the current position of the changeover.

Depending on the position of the changeover, we shall have a 24Vdc output signal between the respective terminal and the common one. These outputs can be used to operate an actuator (lamp, relay, led, etc.).

Changeover situation	Terminal	Common
Position 0	6	5
Position I	7	5
Position II	8	5

Imax 200mA x terminal.

Terminal max. capacity: 1,5 mm² (without clamps) / 1 mm² (with clamps).

⚠️ *Take into account terminals polarity (see annexe 3, page 15).*
Do not short-circuit the terminals with the common one.

C - INPUT SIGNALS

The electrical inputs indicate to the motorised unit the position to move. When closing the circuit we have a 24Vdc signal, internally provided by the motorised unit.

The switching order is carried out by closing the circuit through a (non-voltage) contact between one of the terminals and the common one.

Switching order	Terminal	Common
Go to position 0	12	9
Go to position I	11	9
Go to position II	10	9

Terminal max. capacity: 1,5 mm² (without clamps) / 1 mm² (with clamps).
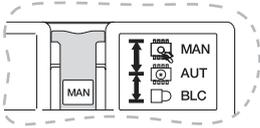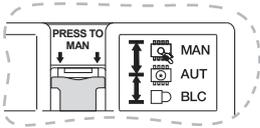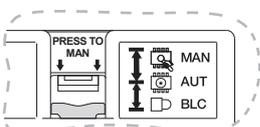
RS485/MODBUS COMMUNICATION

It permits the total digital control of the motorised unit with the input/output management.

See page 10 for table with addresses and operation.

	Terminal
-	A
+	B
Common	SG

Terminal max. capacity: 1,5 mm² (without clamps) / 1 mm² (with clamps).

E - OPERATION SELECTOR

Selector	Position	Description
	MAN	Operation only with the manual handle, electric operation not possible.
	AUT	Motorised operation with inputs/outputs o RS485 MODBUS.
	BLC	Lock position, manual and motorised operation not possible.

Note: For changing the selector from AUT to MAN press the lever behind the yellow selector.

F - PROTECTION FUSE

Fuse 5x20 delayed type (T). High breaking capacity (HBC), 1,5kA, ceramic.
See fuse rating table in annexe 5.

G - POSITION LED'S

They indicate the current position of the changeover. According to the position in which the changeover is, the respective led will be illuminated.

H - ERROR SIGNALS

The motorised unit has a diagnostic system that discriminates the error signal according to the signal type of the led.

Motorised unit error
Signal: Intermittent led with a 1Hz frequency.
Cause: Internal fault in the motorised unit.
Solution: Contact the manufacturer.

Blown Fuse
Signal: Fixed led.
Cause: Protection fuse melt.
Solution: Replace the fuse. If the fuse keep melting, please contact the manufacturer.

Operation malfunctioning
Signal: Intermittent led with a 5 Hz frequency.
Cause: Not switching when commanding.
Solution: Operate again the current position of the changeover.

Manipulation error
Signal: Intermittent led with a 5 Hz frequency, selector in position AUT, yellow latch broken.
Cause: Undue manual operation with the selector in AUT.
Solution: Switch off and switch on the supply again.

Operating modes

There are 3 operating modes selectable with the frontal yellow selector (E):

- Manual operation
- Automatic operation
- Lock mode

Manual operation

To operate in this operating mode the frontal selector has to be in the manual position. From AUT position we pass to MAN position by pressing the lever behind the yellow selector.

The changeover switch can be operated only with the direct handle.

Inputs

Automatic operation is not possible in this position. It doesn't respond to the commands entered by the communication bus nor to the electric signals.

Information about the changeover position is sent via MODBUS.

Outputs

We shall have a 24Vdc output (200 mA max) between the common terminal n.5 and terminals 6 (position 0), n.7 (position I), 8 (position II). These outputs can be used to operate an actuator (lamp, relay, led, etc.).

Example of manual operation:
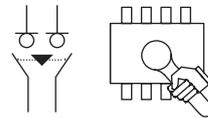
Manual operating mode
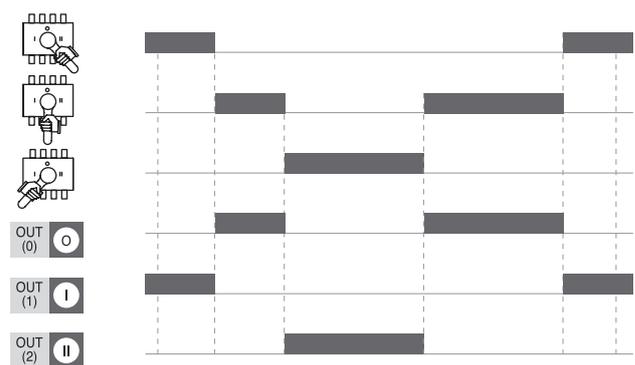
⚠️ *Take into account terminals polarity (see annexe 3, page 15).*
Do not short-circuit the terminals with the common one.

Automatic operation

The changeover can be remote-controlled in two ways.

- Control through electric inputs/outputs
- MODBUS control

In this operation mode the system can be driven in any of these control modes.

The motorised unit executes the first input signal. In order to avoid duplicate signals, when we give an order via MODBUS, the signal inputs will be blocked automatically, and then unblocked when the motorised unit reaches the required position. Between two signals, the motorised unit disables the signal inputs during two seconds.

Inputs

The switching is made by pulse or maintained contact.

CONTROL BY PULSE

The switching order is made by pulse between terminal 9 and terminals 12 (position 0), 11 (position I) y 10 (position II).

Minimum duration of pulse 100 ms.

Example of control by pulse:

Tmin = 100 ms.

CONTROL BY PULSE

IN (0) O	
IN (1) I	
IN (2) II	
OUT (0) O	
OUT (1) I	
OUT (2) II	
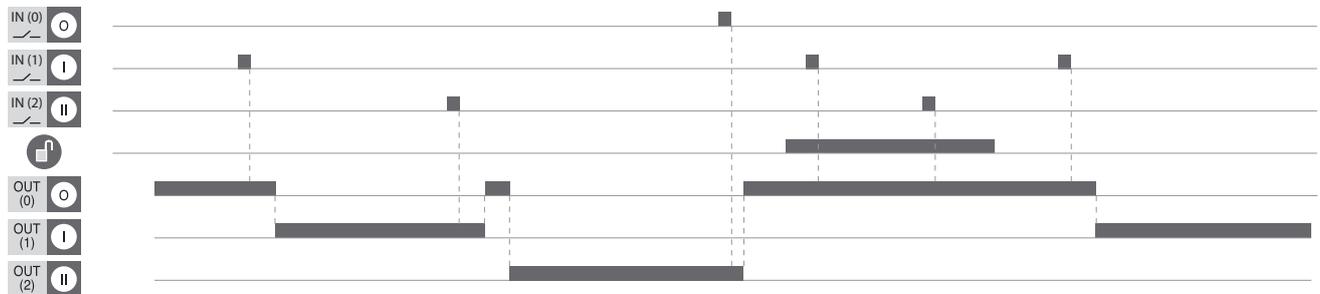
CONTROL BY MAINTAINED PULSE

The switching order is made by maintained pulse between terminal 9 and terminals 12 (position 0), 11 (position I) y 10 (position II).

Example of control by maintained contact:
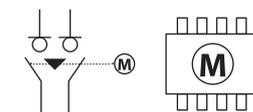
CONTROL BY MAINTAINED PULSE

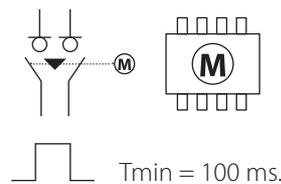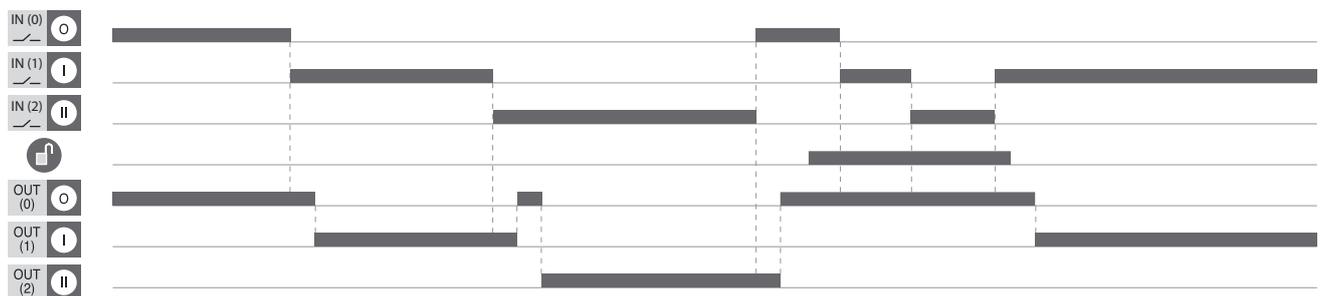|	
IN (0) O	
IN (1) I	
IN (2) II	
OUT (0) O	
OUT (1) I	
OUT (2) II	

Outputs

We shall have a 24Vdc output (200 mA max) between the common terminal n.5 and terminals 6 (position 0), n.7 (position I), 8 (position II). These outputs can be used to operate an actuator (lamp, relay, led, etc.).

⚠ *Take into account terminals polarity (see annexe 3, page 15).*
Do not short-circuit the terminals with the common one.

Operating modes

The devices communicate themselves through the MOD-BUS protocol, using a technique master-slave where only one device (the master) can start transactions (requests). Other devices (slaves) respond providing to the master the requested date, or realizing the requested action.

During the transmission, the motorised unit uses a speed of 9600 baud, the address of the device is04h and it uses 8 bits without parity and with 1 stop bit in RTU format.

The MODBUS protocol indicates the format for the master's request, and it includes the address of the slave device, a code of function that defines the requested action, any

data to be sent and a field for error checking. (When there is more than one, it will be necessary to put different addresses for each unit. This function shall be done in the factory under client's request).

Slave answer message is also defined by the MODBUS protocol. It contains fields that confirm the action, any data to be returned and a field for error checking. If the message received by the slave is defective, or the slave is unable to make the requested action, it will generate an error message and send it as an answer.

ACTUATION ORDERS

To drive the changeover, function n.5 (Force single coil) is used as follows.

Slave address	Function	High address	Low address coil	Force data high	Force data low	CRC high	CRC low	Meaning
-	05h	00h	00h	FFh	00h	-	-	Go to 0
-	05h	00h	01h	FFh	00h	-	-	Go to 1
-	05h	00h	02h	FFh	00h	-	-	Go to 2

(04h default)

The answer for a correct order is an echo to the received one.

The answer for a right order has the following form:

Slave address	Function	Error code	CRC high	CRC low	Meaning
-	85h	XXh	-	-	Function error

(04h default)

Where the value of the exception code XXh is among the following ones:

Code	Name	Meaning
01h	Illegal function	Function not recognised
02h	Illegal data address	Data address not valid. if not is 0000h, 0001h o 0002h
03h	Illegal data value	Data field not valid. different to FF00h
04h	Slave device failure	If the motor fails, there is an internal failure, or blown fuse

(04h default)

DATA REQUEST

The function used is 02h "Read Input Status" and is used in the next general form:

Slave address	Function	Starting address high	Starting address low	Number of points high	Number of points low	CRC high	CRC low	Meaning
-	02h	00h	00h	00h	10h	-	-	Data request

(04h default)

The answer for this request is:

Slave address	Function	Bytes number	Second byte 8-F	First byte 0-7	CRC high	CRC low	Meaning
-	02h	02h	XXh	XXh	-	-	Answer

(04h default)

THE MEANING OF THE BITS OF THE RETURNED WORD

In order to code the different answers returned, every bit of the two bytes returned is used with the following meanings:

	Bit address	State	Meaning	State	Meaning
First byte	0	0	The changeover is NOT in 0	1	The changeover is in 0
	1	0	The changeover is NOT in I	1	The changeover is in I
	2	0	The changeover is NOT in II	1	The changeover is in II
	3	0			
	4	0	Automatic detector NOT activated	1	Automatic detector activated
	5	0	Lock detector NOT activated	1	Lock detector activated
	6	0		1	
	7	0		1	
Second byte	8	0	NO manipulation error	1	Manipulation error, it has been moved
	9	0	NO operation error	1	Operation error, does not reach the objective
	A	0	NO error of relay	1	Error of UM
	B	0	NO Blown fuse	1	Blown Fuse
	C	0	Configured in switch mode	1	Configured in changeover mode
	D	0	Pushbutton "go to 0" NOT actuated	1	Pushbutton "go to 0" actuated
	E	0	Pushbutton "go to I" NOT actuated	1	Pushbutton "go to I" actuated
	F	0	Pushbutton "go to II" NOT actuated	1	Pushbutton "go to II" actuated

Note: Bits 0, 1 and 2 are activated separately; if one of them is activated, the other two must be deactivated.
Note: If both the bits 4 and 5 are in 0, the motorised unit is in MAN. They can't be both activated at the same time.

The answer for an error has the following form:

Slave address	Function	Error code	CRC high	CRC low	Meaning
-	82h	XXh	-	-	Answer error

(04h default)

Where the value of the code XXh is among the following ones:

Code	Name	Meaning
01h	Illegal function	Function not recognised
02h	Illegal data address	Invalid data address, if is different to 0000h
03h	Illegal data value	Invalid data value, if is different to 0010h

Lock mode

In this mode it is not possible to operate the switch in either manual or electric modes. We reach this position by lowering completely the yellow lever. This is an unstable position. In order to keep it, we can set up to 3 padlocks (max. Ø6).

Annexe 1

The range of motorised unit **MU** is available from 200 to 1.800A*, and supply voltages are 120, 230, 277 Vac.

| A | Series | Changeover I-0-II | |
| | | 3P | 3P+N |
		Code	Code
200	CCF	CCF02003PS0	CCF02003NS0
250	CCF	CCF02503PS0	CCF02503NS0
315	CCF	CCF03153PS0	CCF03153NS0
400	CCF	CCF04003PS0	CCF04003NS0
500	CCF	CCF05003PS0	CCF05003NS0
630	CCF	CCF06303PS0	CCF06303NS0
800	CCF	CCF08003PS0	CCF08003NS0
1000	CCF	CCF10003PS0	CCF10003NS0
1250	CCF	CCF12503PS0	CCF12503NS0
1600	S5000F	S5F16003PS0	S5F16003NS0
1800	S5000F	S5F18003PS0	S5F18003NS0

| A | Series | Motorised unit **MU** | | | |
| | | 120 V ac | 230 V ac | 277 V ac | Torque |
		Last code	Last code	Last code	Nxm
200	CCF	UM-C11120A	UM-C11230A	UM-C11277A	18
250	CCF	UM-C11120A	UM-C11230A	UM-C11277A	18
315	CCF	UM-C15120A	UM-C15230A	UM-C15277A	25
400	CCF	UM-C15120A	UM-C15230A	UM-C15277A	25
500	CCF	UM-C21120A	UM-C21230A	UM-C21277A	57
630	CCF	UM-C21120A	UM-C21230A	UM-C21277A	57
800	CCF	UM-C25120A	UM-C25230A	UM-C25277A	78
1000	CCF	UM-C31120A	UM-C31230A	UM-C31277A	110
1250	CCF	UM-C35120A	UM-C35230A	UM-C35277A	150
1600-1800	S5000F	UM-C35120A	UM-C35230A	UM-C35277A	150

For inverted mountings there are references for motorised units **MU** with inverted frontal plates. Supply under request.

* Please consult for 2000, 2500 and 3150A.

DIMENSIONS
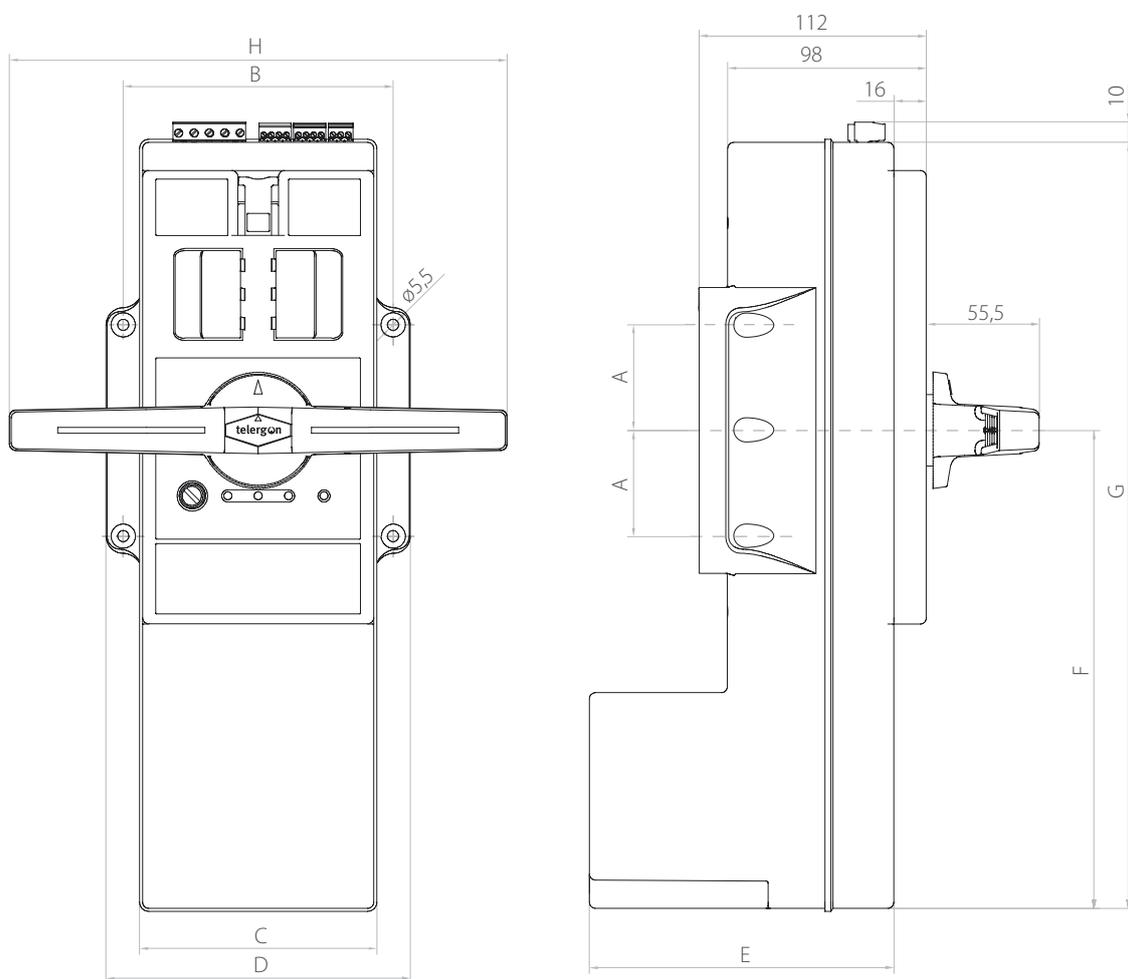
MU	M Max. Nxm	A	B	C	D	E	F	G	H	I	J	K	L	M Max. Nxm	MU
UM-C11120A															UM-C15120A
UM-C11230A	18	52,5	133	117	150	150	237	380	245	310	235	383	254	25	UM-C15230A
UM-C11277A															UM-C15277A
UM-C21120A															UM-C25120A
UM-C21230A	57	88,5	167	153	184	172	312	455	361	339	321	468	283	78	UM-C25230A
UM-C21277A															UM-C25277A
UM-C31120A															UM-C35120A
UM-C31230A	110	88,5	167	153	184	172	312	455	361	367	424	522	311	150	UM-C35230A
UM-C31277A															UM-C35277A

For inverted mountings there are references for motorised units **MU** with inverted frontal plates. Supply under request.

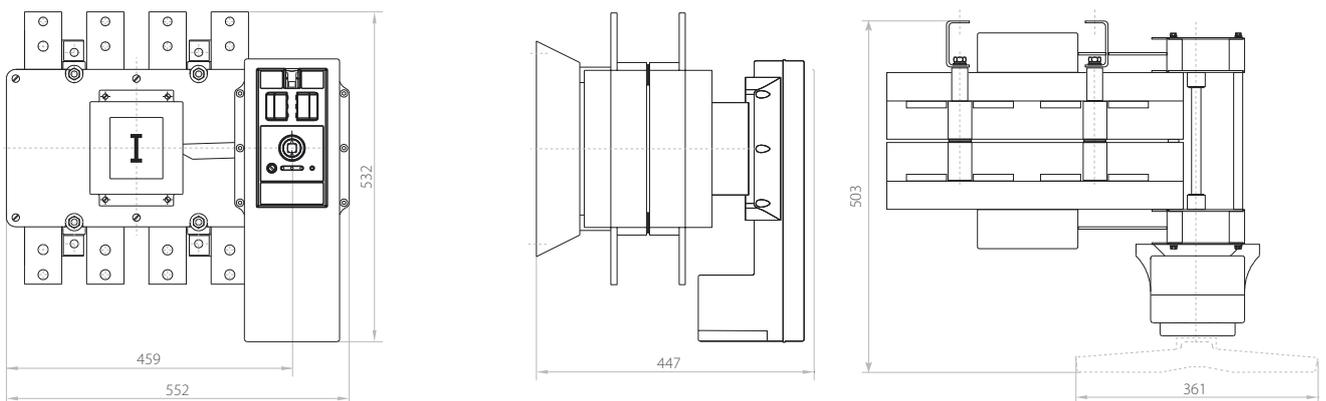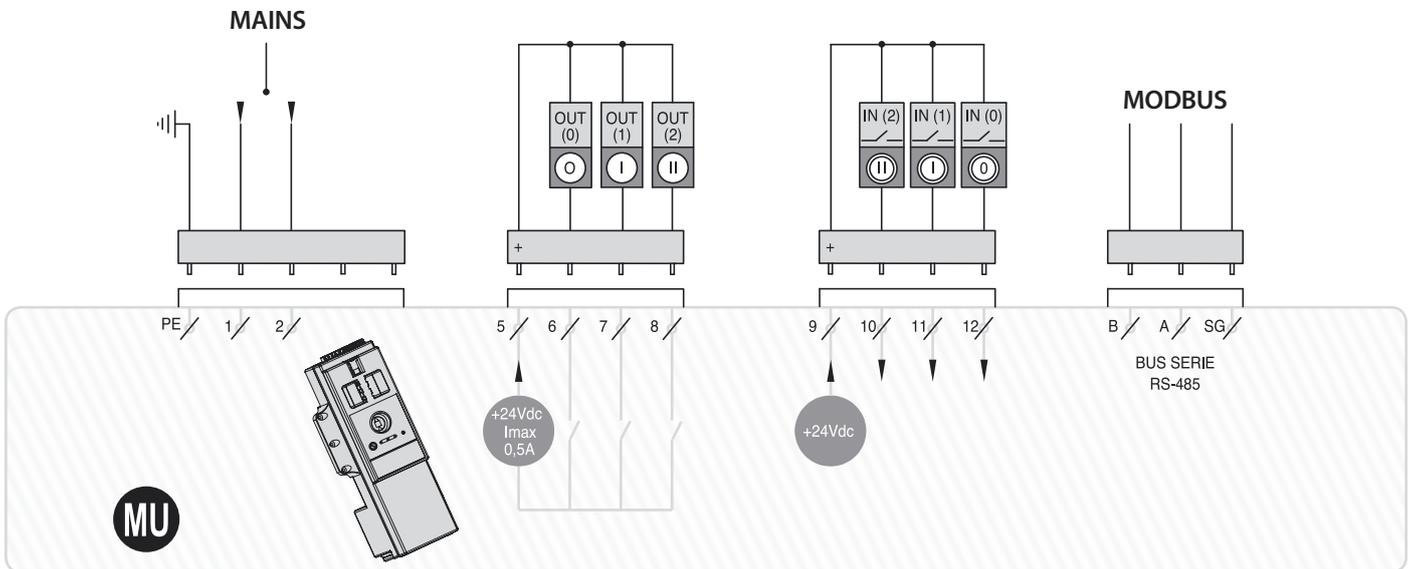* Please consult for 2000, 2500 and 3150A.

Annexe 2
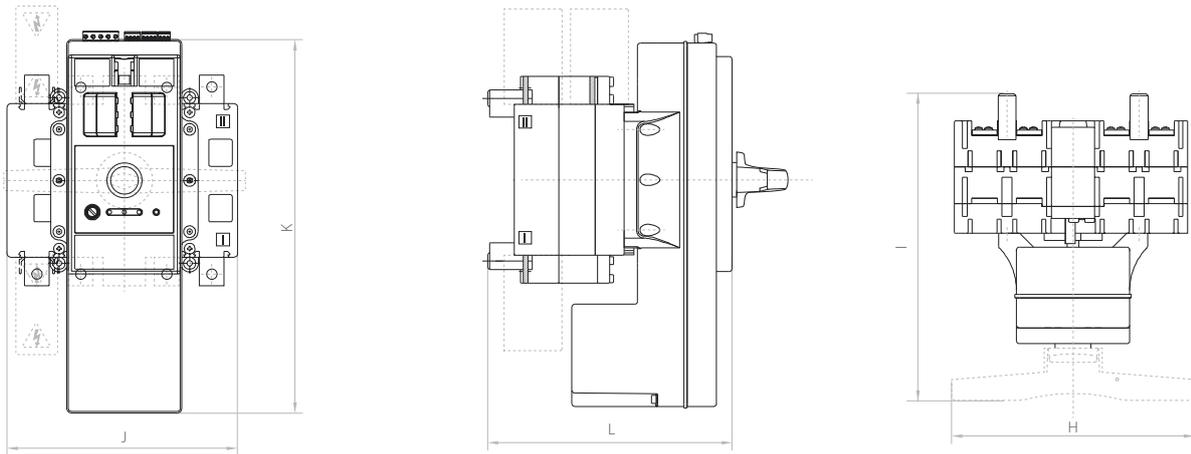
WIRING DIAGRAM

Output signals
OUT (0), OUT (I), OUT (II)

Depending on the position of the changeover we shall have a 24Vdc output (200 mA max) between the common terminal n.5 and terminals 6 (position 0), n.7 (position I), 8 (position II). These outputs can be used to operate an actuator (lamp, relay, led, etc.).

> ⚠ *Take into account terminals polarity.*
> *Do not short-circuit the terminals with the common one.*

Input signals
IN (0), IN (I), IN (II)

When closing the circuit we have a 24Vdc signal, internally provided by the motorised unit.

The switching order is carried out by closing the circuit through a (non-voltage) contact between the common terminal 9 and terminals 12 (position 0), 11 (position I) and 10 (position II).

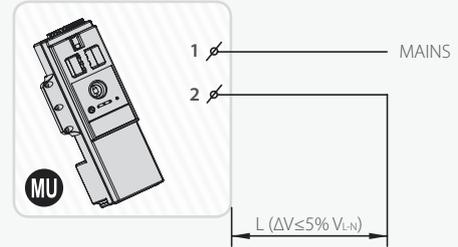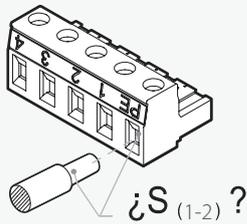**Note:** Indicative electric drawing.

*** WIRING PROPOSED FOR EXTERNAL
UNINTERRUPTED SUPPLY**

K1, K2 = 230 Vac = Coil 230 Vac
K1, K2 = 120 Vac = Coil 120 Vac
K1, K2 = 277 Vac = Coil 277 Vac
K1, K2 relays electric and mechanically interlocked

Annexe 4

¿S (1-2) ?

MAINS

L (ΔV≤5% V$_{L-N}$)
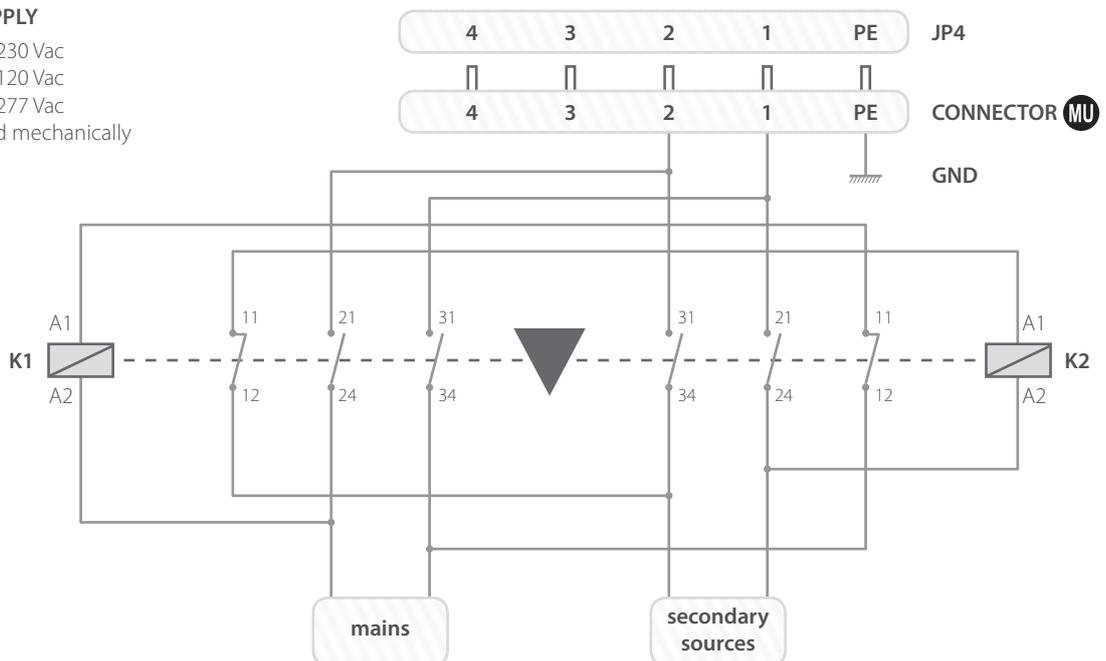
	MU	**S (Cu) (mm²)**			**MU**	
		1,5	**2,5**	**4**		
120 Vac	UM-C11120A	264	440	700	UM-C15120A	120 Vac
230 Vac	UM-C11230A	670	1100	1800	UM-C15230A	230 Vac
277 Vac	UM-C11277A	940	1560	2000	UM-C15277A	277 Vac
120 Vac	UM-C21120A	75	125	200	UM-C25120A	120 Vac
230 Vac	UM-C21230A	250	420	675	UM-C25230A	230 Vac
277 Vac	UM-C21277A	380	635	1015	UM-C25277A	277 Vac
120 Vac	UM-C31120A	49	80	130	UM-C35120A	120 Vac
230 Vac	UM-C31230A	160	270	435	UM-C35230A	230 Vac
277 Vac	UM-C31277A	244	400	650	UM-C35277A	277 Vac

S max without clamp 4 mm² / S max with clamp 2,5 mm²

¿S (5-12) ?

5

12

L (ΔV=5% 24 V)
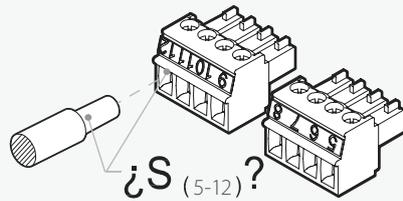
S (5-12) = 1,5 mm² Cu max. => L$_{MAX}$ = 210 m => ΔV = 5% 24 V = 1,2 V

¿S (A-B-SG) ?

A

B

SG
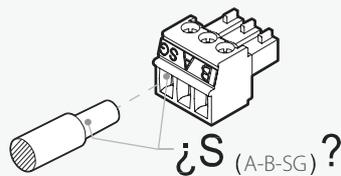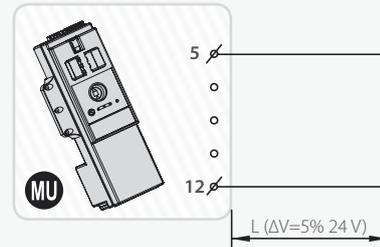
S (A-B-SG) = 1,5 mm² max. => L$_{MAX}$ = 1.000 m => Shielded stranded pair / Line impedance = 100 Ω
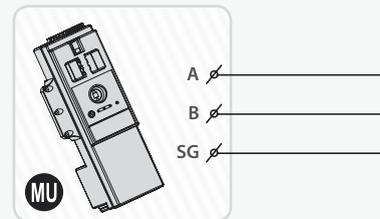
Annexe 5

Voltage **MU**	Reference **MU**	Fuse 5 x 20 (A)
120 Vac	UM-C11120A / UM-C15120A	0,8
230 Vac	UM-C11230A / UM-C15230A	0,5
277 Vac	UM-C11277A / UM-C15277A	0,4
120 Vac	UM-C21120A / UM-C25120A	3,15
230 Vac	UM-C21230A / UM-C25230A	2
277 Vac	UM-C21277A / UM-C25277A	1,6
120 Vac	UM-C31120A / UM-C35120A	5
230 Vac	UM-C31230A / UM-C35230A	3,15
277 Vac	UM-C31277A / UM-C35277A	2,50

Note: Time delay fuse 5x20 - High breaking capacity (1,5 kA) ceramic.

ELECTRICAL FEATURES

Supply voltage	V	120 Vac +/-15%	230 Vac +/-15%	277 Vac +/-15%
Frequency	Hz	50/60	50/60	60
Ambient temperature Un	ºC	-40º / +65º ([2])		
Maximum load while transferring				
For COS ratings from 200 to 400A	A	1.025	0.695	0.595
For COS ratings from 630 to 800A	A	3.415	1.965	1.595
For COS ratings from 1000 to 1800A	A	5.325	3.075	2.475
Minimum idle load	A	0.225	0.225	0.225
Transfer time (maximum values)				
For COS ratings from 200 to 400A	s	0.208	0.192	0.200
For COS ratings from 630 to 800A	s	0.180	0.168	0.174
For COS ratings from 1000 to 1250A	s	0.166	0.148	0.154
For COS ratings from 1600 to 1800A	s	0,172	0,175	0,169
Maximum number of operations ([1])				
For COS from 200 to 400A		7000/10000	7000/10000	7000/10000
For COS from 500 to 630A		4000/10000	4000/10000	4000/10000
For COS of 800A		2500/10000	2500/10000	2500/10000
For COS from 1000 to 1800A		2500/7000	2500/7000	2500/7000
Maximum number of operations hour ([1])				
For COS from 200 to 400A		120/120	120/120	120/120
For COS from 500 to 630A		60/120	60/120	60/120
For COS from 800A		20/120	20/120	20/120
For COS from 1000 to 1800A		20/60	20/60	20/60

([1]) According to IEC-EN 60947-1 / Based in our own tests
([2]) 90% Relative humidity

EMC TABLE

Immunity	Standard	Criterion	Level	Characteristics
Electrostatic discharges	EN 61000-4-2	A	Special	± 8 kV air discharge ± 4 kV equipment discharge
Electromagnetic H.F. field	EN 61000-4-3	A	3	10 V/m
Fast transients (Burst)	EN 61000-4-4	A	4	± 4 kV power supply ± 2 kV signal supply
Fast transient (surge discharge)	EN 61000-4-5	A	Special	± 4 kV power supply L1-L2 Generator impedance 2Ω (wave 1.2/50μs)
Conducted disturbances	EN 61000-4-6	A	3	10 V supply and signal
Electromagnetic field, industrial frequency	EN 61000-4-8	A	4	Field intensity 30 A/m
Voltage dips, interruptions and voltage variations	EN 61000-4-11	A B	- -	60% Un - 1000 ms 95% Un - 5000 ms

Emission	Standard	Criterion	Level	Characteristics
Emission of harmonic current	EN 61000-3-2	- -	3 3	0,02 A total current (manual mode) 0,04 A total current (aut. mode)
Unwanted voltage	EN 55011	-	3	Qualified
Radiated emission	EN 55011		3	Qualified

EN 61000 is equivalent to IEC 61000 - EN 55011 is equivalent to CISPR11
CRITERION A: Normal service behaviour in determined limits
CRITERION B: Transient alteration of the service. The appliance gets back to the normal performing without the intervention of the operator
Test level 3: Typical industrial environment, without special installation measures
Test level 4: Severe industrial environment
Special level: level of higher electromagnetic severe environment

AENOR
Gestión
Ambiental
CGM-01/180

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CERTIFIED
IQNet
MANAGEMENT SYSTEM

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