SAMES KREMLIN

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CE

User manual

MCR control module
VCR converter module

Installation manual

⚠ WARNING : **SAMES KREMLIN** SAS is registered with the Ministry of Labour as a training institution.
Throughout the year, our company offers training courses in the operation and maintenance of your equipment.
A catalogue is available on request. Choose from a wide range of courses to acquire the skills or knowledge that is required to match your production requirements and objectives.
Our training courses can be delivered at your site or in the training centre at our Meylan head office.

Training department:
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E-mail: formation-client@sames-kremlin.com

MCR control module
VCR converter module

Installation manual

1. Health and Safety Instructions

⚠️

WARNING : Live work on the MCR and VCR modules must only be carried out by personnel that are authorised and trained for electrical work.

⚠️

WARNING : This equipment may be hazardous when not used following the safety rules described in this manual.
- The modules MCR and VCR are intended to be installed in a control cabinet made by **SAMES KREMLIN**, which provides the basic level of sealing of the product from its environment (water splashes, pollution from powder and from dust).
  Any utilisation other than prescribed by **SAMES KREMLIN**, remains the sole responsability of the end user (like when used outside of a control cabinet, or installed in an electrical cabinet not made by **SAMES KREMLIN**).
- The MCR and VCR modules must be installed outside of ATEX zones.
- The MCR and VCR modules must be installed away from the powder polluted area.
- The MCR and VCR modules cannot be installed out of doors.
- Ambient temperature in the vicinity of the MCR and VCR modules must be lower than, or equal to 40 C degrees.
- The MCR and VCR modules must be connected to the shop's earth via a green/yellow wire of an at least 6mm2 section.
- The MCR and VCR modules must not be used without their respective covers.
- The MCR and VCR modules must not be modified from their original design.
- Only **SAMES KREMLIN** spare parts, or a repair carried out by the repair department of **SAMES KREMLIN**, will ensure and ascertain the safe operation of the MCR and VCR modules.
- One must turn off electrical power to the MCR and VCR modules prior to pulling off their connectors.
- The " booth ventilation ON " information must be connected to the MCR module, in order to allow for spraying only while the booth is turned on. Should this connection not be established, the
  operation of the system falls entirely under the responsibility of the end user.
- The touch-screen of the MCR module is designed for use with clean or protected hands.There is a protective film to be installed on the screen area. The warranty does not cover pollution of the touch-screen of the MCR module by powder paint.
- The MCR and VCR modules are exclusively designed to operate a **SAMES KREMLIN** RFV series reciprocator, which must be installed in an ATEX zone.
  Any other utilisation of the reciprocator falls under the sole responsibility of the end user.
- The MCR and VCR modules are designed to be used only in conjunction with the potentiometers installed by **SAMES KREMLIN** on the RFV series reciprocators.This whole electrical system is certified by **SAMES KREMLIN**, and guarantees that the potentiometer can be used in an ATEX zones.
- The thermal probe of the RFV's motor must be connected to the VCR module in order to guarantee the utilisation of the RFV in an ATEX zone.

2. Presentation

The MCR control module is used to manage the different functions of a powder installation.
It can control up to two **SAMES KREMLIN** RFV robots (powder version, maxi. speed: 25m/mn).

Possible axis configurations are as follows:
- No robot.
- 1 RFV robot with one up and down axis
- 1 RFV robot with one up and down axis and one in and out axis
- 2 RFV robots each with one up and down axis.
- 2 RFV robots each with one up and down axis and one in and out axis.

It enables each robot to move in an up and down sweeping motion and perform a programmed in and out positioning according to the type of component in process.
The up and down motion can be different for each robot.
A serial link on/off control is also available for 24 spray guns (Auto Mach-Jet or Inobell powder projector) for the RFV version and 4 modules for the robotic version.

It also manages the centralised control of the CRN457 or TCR modules by serial link, up to maximum of 24 modules.

Integrating this module into an industrial system is made easier by the availiability of the functions mentioned below:
- Possible automated spraying by detection of parts to be painted using sensors, a photo-electric cell or a barrier of photo-electric cells.

- Part detection on the up and down axis is used to engage the spraying automatically (6 areas).

- Part detection on the in and out axis is used to position the axis automatically.
  (4 areas to the left of the conveyor + 4 areas to the right of the conveyor)

- Emergency stop input (category 3)

- External fault input.

- Fault output.

- Ventilation operating input.

- Conveyor operating input.

- Conveyor belt operation authorisation output.

The MCR modules are 19-inch rack-mounted products, designed to be integrated into the **SAMES KREMLIN** FCR modular cabinet, and combined with different 19 inch rack-mounted **SAMES KREMLIN** spraying modules.

The MCR control module comprises:
- at least one control module, making it possible to manage the powder installation.
- one or two VCR converter modules depending on the number of robot axes to be controlled.

Schematic diagram of the system

Version RFV

	A	B
	1	-
	-	1
V1	1	1
	1+2	-
	-	1+2
V1 + V2	1+2	1+2

Robotic version x4 max.
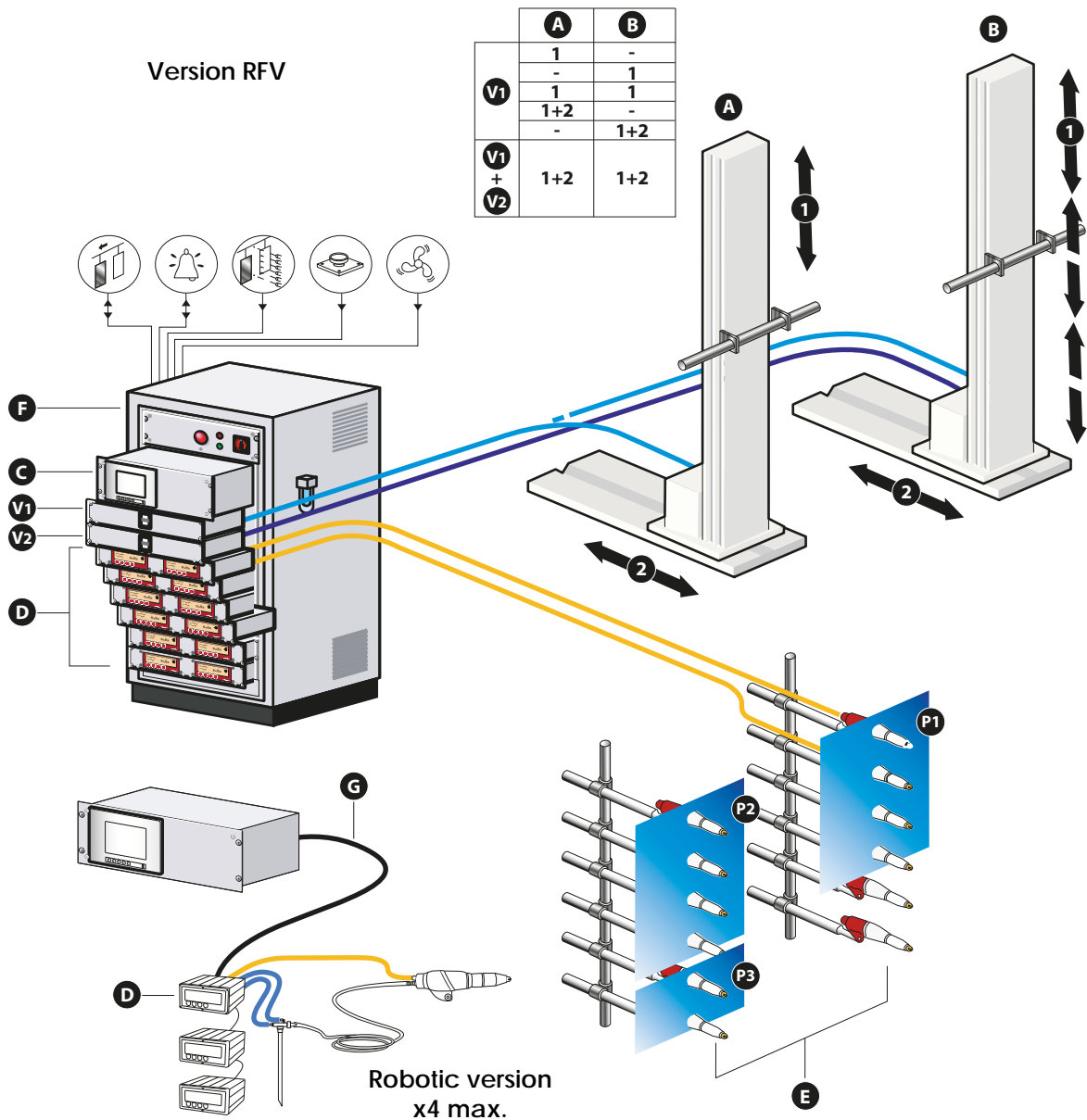
A First robot type RFV2000

B Second robot type RFV2000

1 Up and down movement

2 In and out movement (forward/backward)

C MCR Module

D CRN 457 or TCR Modules

E Maximum of 12 spray guns per robot

F FCR modular cabinet

G Trigger ON/OFF pilot

V1 VCR Module (management of up 2 axes)

V2 VCR Module (management of up 4 axes)

P1 → P3 Example of spraying planes

Input / Output conveyor operation and authorization

Input / Output external fault

Input - Part detection

Input - Emergency stop

Input - Ventilation operation

3. Installation

3.1. Description

The MCR control module consists of an industrial PLC based structure and a touch screen operator console.

The main functions of the On-Off inputs/outputs are as follows:

- management of the interface with the industrial system and the VCR converter modules.
- control of the spray-guns or of the powder projectors.
- management of module specific information.

The analogue inputs/outputs manage the positioning/speed information in conjunction with the VCR converter modules.

A RS485 network link is used to control **SAMES KREMLIN** spraying modules (CRN457 / TCR).

The graphics and touch screen console and the industrial PLC make up the module's Man Machine interface.

3.2. MCR Control module
Front Panel view

7-inch colour touch screen operator console.
65535 colors, 800x 480 pixels

Rear panel view

Ground connection from the module into the machine, and ground connection if not through X0.

The ground connection from the module is made using a green/yellow wire with a diameter of at least 6mm^2.

- X0: Module power supply connector.

- X1: Environment interface connector

- X2: Up and down and in and out part detection connector for RFV - On / Off for robotic spraying.

- X3: Converter module N°1 interface connector.

- X4: Converter module N°2 interface connector.

- X5: Serial link connector for **SAMES KREMLIN** module control.

- X6: Remote code link connector for robotic version.

The connection interface with the system is formed using spring terminal connectors.

WARNING : Never use end-piece for the wires, in this way the connections are more resistant to vibrations and tightnening stress.

The connections have click-on locking, which is easy to use as no tools are needed.
The connectors are indivually protected against inversion.
In addition, each female connector has a traction plate to enable several cables to be grouped together on the same connector and therefore avoid pull on the wires.

3.3. VCR converter module
Front Panel view:

Main circuit-breaker
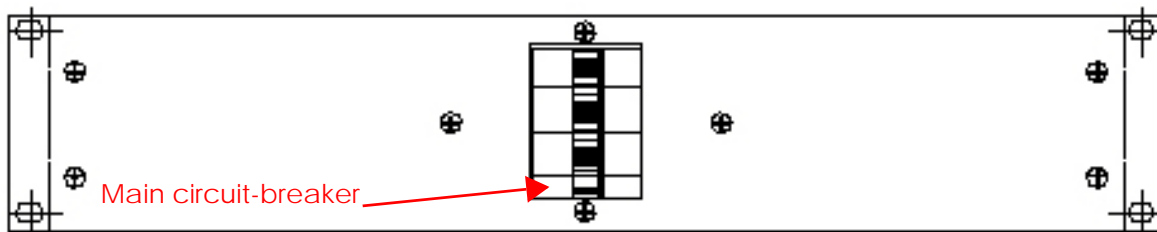
The circuit-breaker cuts the electrical power to the RFV robots to allow maintenance interventions to be carried out.

Rear panel view
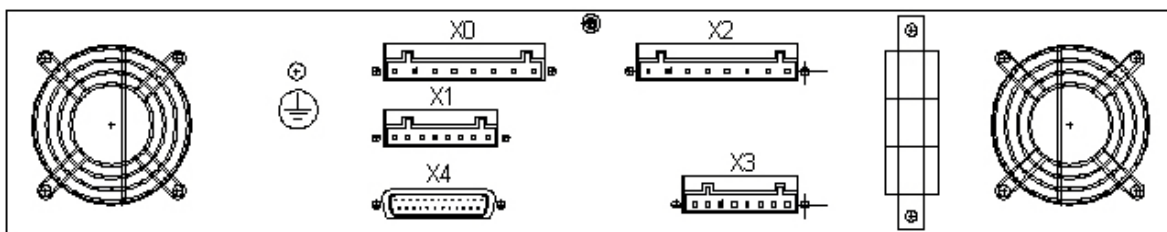
Ground connection from the module into the machine, and connection to ground if not made trough X0.
  The ground connection for the module is made using a green/yellow wire with a diameter of at least 6mm^2.

- X0: Module power supply connector and transfer of power supply to another module where necessary.

- X1: Environment and temperature sensor of the RFV robot motor interface connector.

- X2: RFV robot motor interface connector.

- X3: RFV robot motor potentiometer interface connector.

- X4: Control module interface connector.

Shielding resumption of RFV cables.
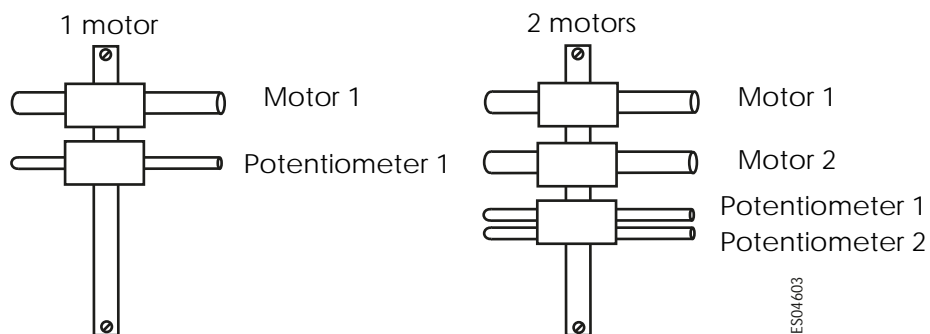
3.4. Characteristics

3.4.1. General characteristics

Ambient temperature	< 40°C
Ambient humidity	< 85% without condensation
Zone	non explosive (it can, however, run a RFV ATEX robot in an explosive zone without additional equipment)

3.4.2. Mechanical characteristics

3.4.2.1. General characteristics of the modules

MCR Control module	
Rack-mounted	19 inches
Height	4U
Degree of protection	IP 20
Weight	10.8 kg
VCR converter module	
Rack-mounted	19 inches
Height	2U
Degree of protection	IP 20
Weight	8.8 kg

3.4.2.2. Module dimensions

MCR Control module	
Height	177 mm
Width	483 mm
Depth	330 mm
VCR converter module	
Height	86 mm
Width	483 mm
Depth	330 mm

3.4.3. Electrical characteristics

3.4.3.1. General characteristics of the modules

Input voltage	230 V single-phase (+/- 10%) Control module
	230 V three-phase (+/- 10%) Converter module
Input frequency range	47 - 63 Hz
Max. input current consumed	1A Control module
	10A Converter module

3.4.3.2. 24V DC Power supply

Output voltage	24V DC
Tolerance	+/- 1%
Maximum capacity	2.5 A

3.4.3.3. Connections

MCR Control module	
Connectors at a gauge of	7.5 mm
Maximum voltage	300V
Maximum capacity	15A
Nominal size of conductor wires	0.08 to 2.5mm2
VCR converter module	
Connectors at a gauge of	5mm
Maximum voltage	300V
Maximum current	10A
Nominal size of conductor wires	0.08 to 2.5mm2

3.4.3.4. Trigger outputs
Dry contact

Rated/max. switching voltage	250/250V AC
Rated/ max. current	7A / 15A
Rated load	1750VA
Rated load (230VAC)	350VA
Interrupting capacity in DC1	30 / 110 / 220V: 7 / 0.25 / 0.12A
Minimum switching load	300 mW (5V / 5mA)
Contact material	AgNi
Mechanical service life AC/DC	20,000,000 / 50,000,000 cycles
Electrical service life at full load AC1	150,000 cycles
Energization/ de-energization response time	9 / 3ms
Dielectric strength open contacts	1000V AC

3.4.3.5. "On-off" inputs

Rated input voltage	24V DC (min -3V DC max 30V DC)
Rated input current	3 mA min (18V DC) / 3.9mA (24V DC) / 4.5mA (30V DC)
Low level voltage threshold	UL max < 5V
High level voltage threshold	UH min > 15V

4. Connection

4.1. Ground connection of the modules

⚠️

WARNING : This equipment must be connected to the ground! If it is not connected to the ground it can cause dangerous conditions.

A green/yellow (G/Y) ground wire must be connected to the appropriate contact and labelled on the rear panel of each module. Each module must be supplied from a ground outlet provided by the power supply unit (star wiring).
The minimum recommended size is 6mm^2.

4.2. Connection of module supply voltage

4.2.1. MCR Control module

The supply voltage must be 230 Volts single phase +/- 10%.
The frequency must be between 47 and 63 Hertz.
The available current must be higher than 1 Amp.

This module is supplied by the electrical module of the FRC cabinet.
The cable recommended by **SAMES KREMLIN** is the 3 G 1 mm^2 Ref.: E2LAAC100.

Special case:

If the module has to be connected to a mains plug, a 2.5m long mains power cable must be used (Ref.: E4PCAL580).

Terminal box X0	Electrical supply
Pin 1	L1/N
Pin 2	L2
Pin 3	Ground (Green/Yellow)

4.2.2. VCR converter module

The supply voltage must be 230 Volts three-phase +/- 10%
The frequency must be between 47 and 63 Hertz
The available current must be higher than 10 Amps.

This module is supplied by the electrical module of the FRC cabinet.
The cable recommended by **SAMES KREMLIN** is a 4 G 1.5 mm^2 (Ref.: E2CDKR004).

Special case:

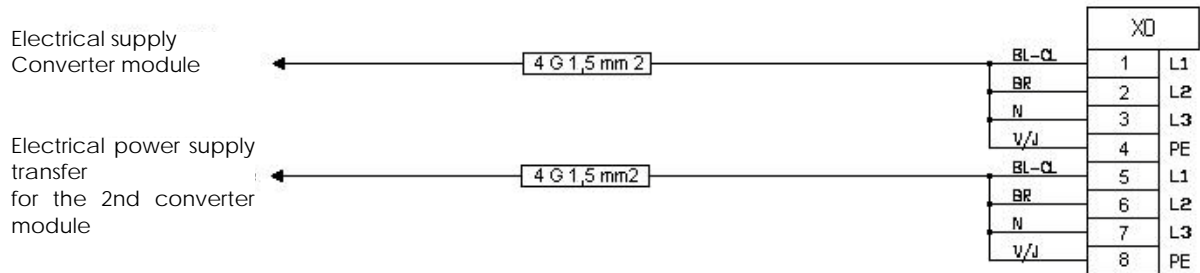If the module has to be connected to a mains plug, a 2.5m long mains power cable must be used (Ref.: E4PCAL580).

In the event of the module being supplied with 230 Volts single phase, terminals 1 and 2 have to be bridged:
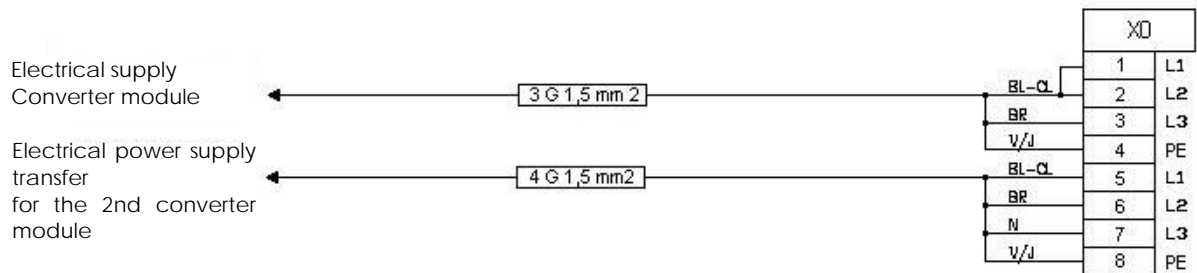
WARNING : Resistance to the 30mA differential is not guaranteed if the connection is made to a protected mains plug.

Terminal box X0	Electrical supply
Pin 1	L1/N
Pin 2	L2
Pin 3	L3
Pin 4	Ground (Green/Yellow)
Pin 5	Electrical power supply transfer L1/N
Pin 6	Electrical power supply transfer L2
Pin 7	Electrical power supply transfer L3
Pin 8	Electrical power supply transfer Ground (Green/Yellow)

4.3. Connection of the RFV robots to the VCR converter module
Motor connection

```
Power
Robot motor axis 1 or 3  ◄────── 4 G 1,5 mm 2 ──────┤  1    X2
                                                      2    ┌──────┐
                                                      3    │ 1  U │
                                                     V/J   │ 2  V │
Power                                                 1    │ 3  W │
Robot motor axis 2 or 4  ◄────── 4 G 1,5 mm2 ────────┤ 2   │ 4  PE│
                                                      3    │ 5  U │
                                                     V/J   │ 6  V │
                                                           │ 7  W │
                                                           │ 8  PE│
                                                           └──────┘
```
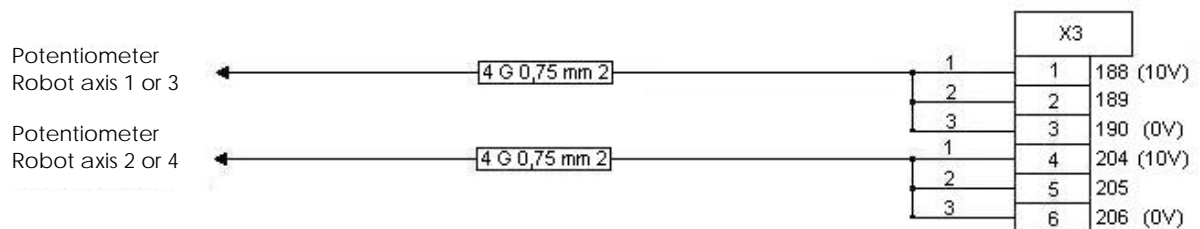
Temperature sensor connection

```
                                                              X1
                                                           ┌──────┐
                                                           │  1   │
                                                           │  2   │
                                                           │  3   │
Temperature sensor                                    1    │  4   │
Robot motor axis 1 or 3  ◄────── 2 x 1 mm 2 ─────────┤ 2   │  5  24V │
                                                           │  6  186 │
Temperature sensor                                    1    │  7  24V │
Robot motor axis 2 or 4  ◄────── 2 x 1 mm 2 ─────────┤ 2   │  8  202 │
                                                           └──────┘
```
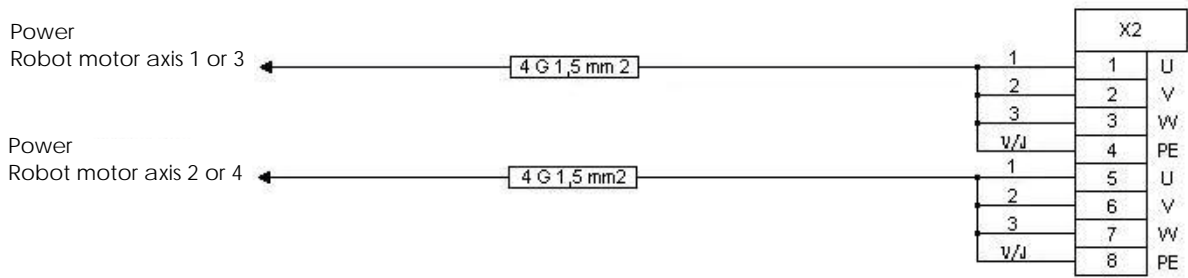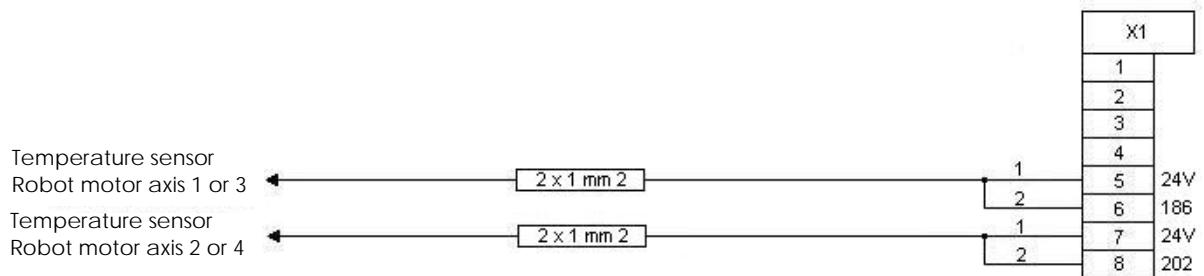
⚠️ **WARNING : The connection of the RFV robot motor temperature sensor is mandatory in order to comply with the ATEX certification. The module only manages PTO type temperature sensors (dry contact).**

Potentiometer connection

```
                                                                X3
                                                             ┌──────────────┐
Potentiometer                                         1      │ 1  188 (10V) │
Robot axis 1 or 3  ◄────── 4 G 0,75 mm 2 ─────────┤  2       │ 2  189       │
                                                      3      │ 3  190 (0V)  │
Potentiometer                                         1      │ 4  204 (10V) │
Robot axis 2 or 4  ◄────── 4 G 0,75 mm 2 ─────────┤  2       │ 5  205       │
                                                      3      │ 6  206 (0V)  │
                                                             └──────────────┘
```

⚠️ **WARNING : The ATEX certification is guaranteed only when the SAMES KREMLIN potentiometer delivered with the robot is used.**

⚠️ **WARNING : The motor and potentiometer cable shielding must be connected to the spring clips provided for this purpose (see § 3.3 page 9).**

The recommended cables are:

Part	Size	Reference
Motor	4 G 1.5mm^2 shielded	E2BAAD150
Temperature sensor	2 x 1mm^2	E2LAAB100
Potentiometer	4 G 0.75mm^2 shielded	E2BAAD075

Cabless prepared in 30m lengths are also available:

Part	Name	Reference
Motor	MCR motor cable	1411222
Temperature sensor	MCR temperature sensor cable	1411223
Potentiometer	MCR potentiometer cable	1409971

Terminal box X2	Motor connection
Pin 1	Motor phase U axis 1 or 3
Pin 2	Motor phase V axis 1 or 3
Pin 3	Motor phase W axis 1 or 3
Pin 4	Ground axis 1 or 3
Pin 5	Motor phase U axis 2 or 4
Pin 6	Motor phase V axis 2 or 4
Pin 7	Motor phase W axis 2 or 4
Pin 8	Ground axis 2 or 4

Terminal box X1	Temperature sensor connection
Pin 1	
Pin 2	
Pin 3	
Pin 4	
Pin 5	Temperature sensor axis 1 or 3
Pin 6	Temperature sensor axis 1 or 3
Pin 7	Temperature sensor axis 2 or 4
Pin 8	Temperature sensor axis 2 or 4

Terminal box X3	Potentiometer connection
Pin 1	10V Potentiometer power supply
Pin 2	Potentiometer return value 0-10V
Pin 3	0V Potentiometer power supply
Pin 4	10V Potentiometer power supply
Pin 5	Potentiometer return value 0-10V
Pin 6	0V Potentiometer power supply

The converter is configured in the factory for a 0.75 kW/230 Volt motor.

Converter output voltage
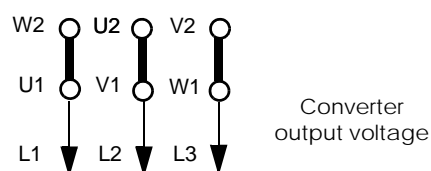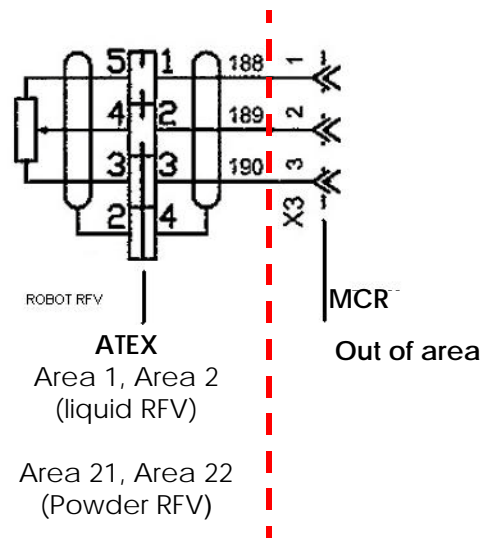
The motor must therefore be configured in a "triangle" as follows.

The characteristics of the motor programmed in the converter are the following:

Motor Rated Voltage	230V
Rated motor current	3.55A
Motor Rated Power	0.75kW
Motor Rated Cos Phi	0,75
Motor Rated Frequency	50 Hz
Rated motor speed	1355 min^{-1}
Rise time	0.5 seconds
Fall time	0.5 seconds
Chopping frequency	4 KHz

Robot pentiometer connection detail:

ROBOT RFV

ATEX
Area 1, Area 2
(liquid RFV)

Area 21, Area 22
(Powder RFV)

MCR

Out of area

4.4. Connection of the spraying modules to the MCR control module
Spraying module with serial link

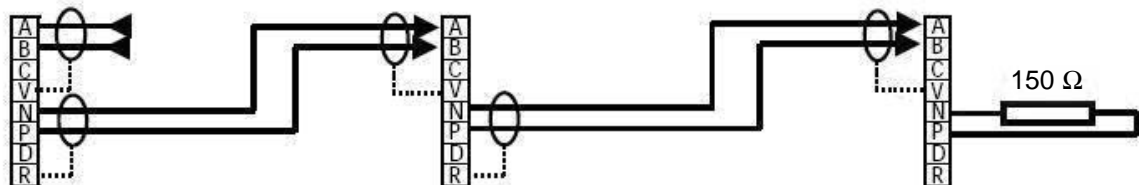The modules are operated by serial link via the X5 connector.
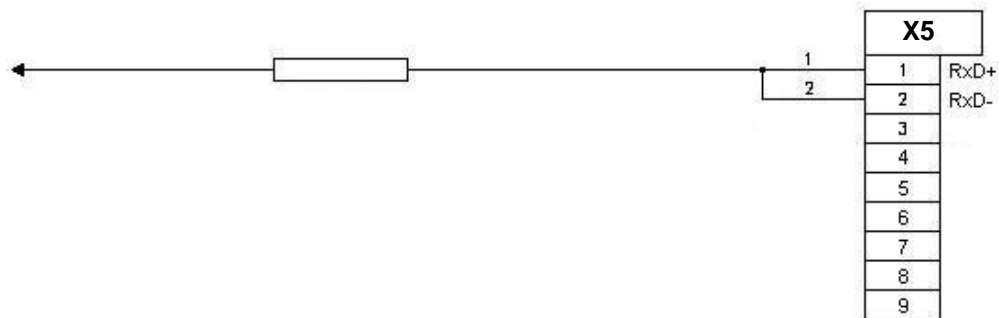
All spraying modules that are compatible with the serial link are connected to this network.

The maximum number of modules operated by serial link is 24.

The communication speed of the MCR serial link is 19200 Baud.

A 150 Ohm (± 5%) end of line resistancor must be installed on the last module.

Consult the electrical diagram or the product user manual to find the connection detail for the spraying module.

The cable recommended by **SAMES KREMLIN** is a shielded cable pair (Ref.: 110000029).

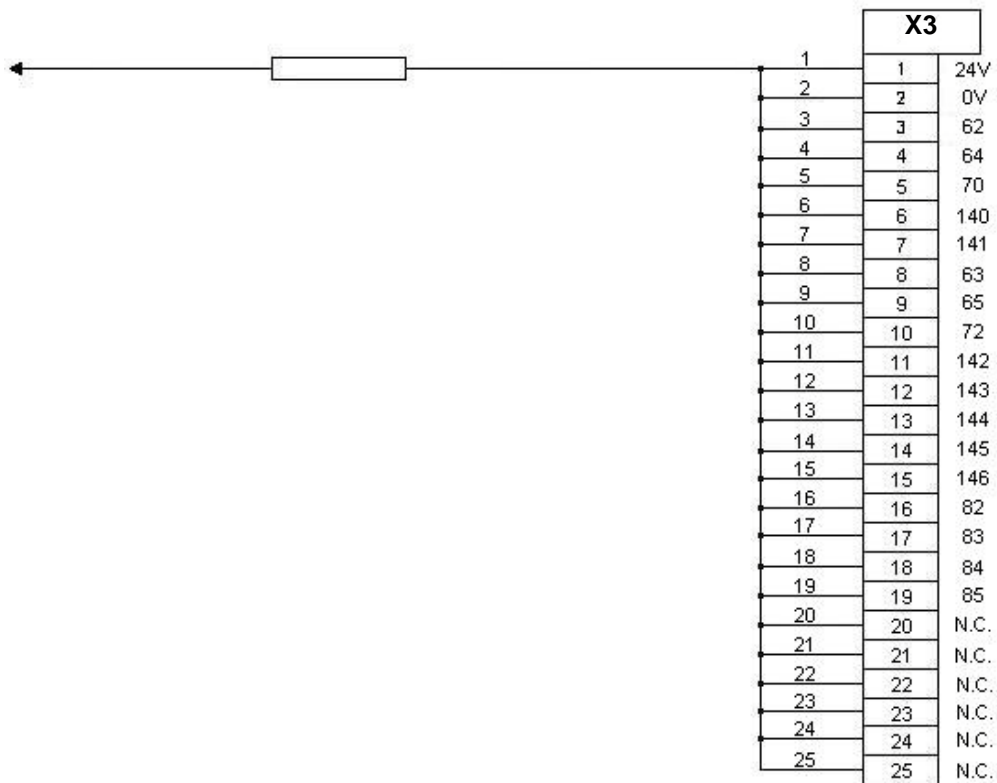The module's X5 connector is a 9 pin SUB-D female metal socket.

WARNING : The cable shielding must be connected to the metal cover of the 9 pin SUB-D male connector.

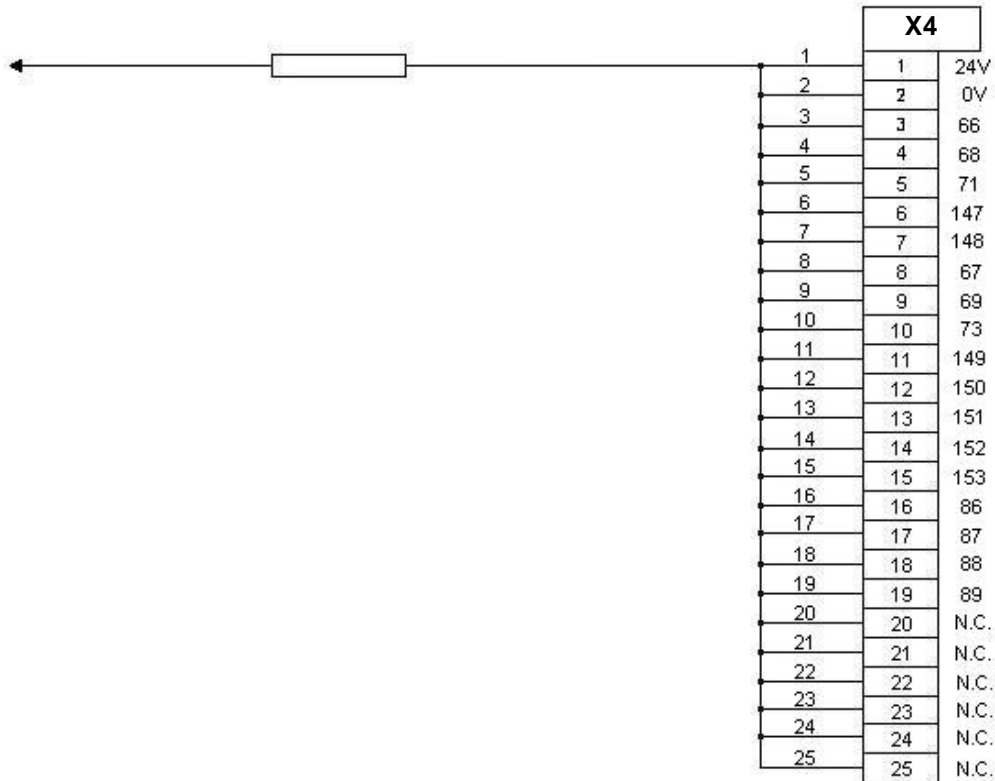### 4.5. Connection between the MCR control module and the VCR converter modules.

The MCR control module can manage up to two VCR converter modules via the X3 and X4 connectors.

The X3 connector manages axes 1 and 2 and the X4 connector, axes 3 and 4.

	X3	
1	1	24V
2	2	0V
3	3	62
4	4	64
5	5	70
6	6	140
7	7	141
8	8	63
9	9	65
10	10	72
11	11	142
12	12	143
13	13	144
14	14	145
15	15	146
16	16	82
17	17	83
18	18	84
19	19	85
20	20	N.C.
21	21	N.C.
22	22	N.C.
23	23	N.C.
24	24	N.C.
25	25	N.C.

The module's X3 and X4 connectors are 25 pin SUB-D female metal sockets.

**SAMES KREMLIN** recommend using a SUB-D 25 male-male extension (Ref: 110000524).

X4

	Pin	Signal
1	1	24V
2	2	0V
3	3	66
4	4	68
5	5	71
6	6	147
7	7	148
8	8	67
9	9	69
10	10	73
11	11	149
12	12	150
13	13	151
14	14	152
15	15	153
16	16	86
17	17	87
18	18	88
19	19	89
20	20	N.C.
21	21	N.C.
22	22	N.C.
23	23	N.C.
24	24	N.C.
25	25	N.C.

Terminal box X3	Description	Terminal box X4	Description
Pin 1	24V DC power supply	Pin 1	24V DC power supply
Pin 2	Common 0V	Pin 2	Common 0V
Pin 3	Direction 1 axis 1	Pin 3	Direction 1 axis 3
Pin 4	Direction 2 axis 1	Pin 4	Direction axis 3
Pin 5	Fault reset converter axis 1	Pin 5	Fault reset converter axis 3
Pin 6	Converter axis 1 OK	Pin 6	Converter axis 3 OK
Pin 7	Converter module 1 OK	Pin 7	Converter module 3 OK
Pin 8	Direction 1 axis 2	Pin 8	Direction axis 4
Pin 9	Direction 2 axis 2	Pin 9	Direction 2 axis 4
Pin 10	Fault reset converter axis 2	Pin 10	Fault reset converter axis 4
Pin 11	Converter axis 2 OK	Pin 11	Converter axis 4 OK
Pin 12	Return pot. 0-10V axis 1 positive	Pin 12	Return pot. 0-10V axis 3 positive
Pin 13	Return pot. 0-10V axis 1 negative	Pin 13	Return pot. 0-10V axis 3 negative
Pin 14	Return pot. 0-10V axis 2 positive	Pin 14	Return pot. 0-10V axis 4 positive
Pin 15	Return pot. 0-10V axis 2 negative	Pin 15	Return pot. 0-10V axis 4 negative

Terminal box X3	Description	Terminal box X4	Description
Pin 16	Speed setpoint 0-10V axis 1 positive	Pin 16	Speed setpoint 0-10V axis 3 positive
Pin 17	Speed setpoint. 0-10V axis 1 negative	Pin 17	Speed setpoint. 0-10V axis 3 negative
Pin 18	Speed setpoint. 0-10V axis 2 positive	Pin 18	Speed setpoint. 0-10V axis 4 positive
Pin 19	Speed setpoint. 0-10V axis 2 negative	Pin 19	Speed setpoint. 0-10V axis 4 negative
Pin 20	Not connected	Pin 20	Not connected
Pin 21	Not connected	Pin 20	Not connected
Pin 22	Not connected	Pin 20	Not connected
Pin 23	Not connected	Pin 20	Not connected
Pin 24	Not connected	Pin 20	Not connected
Pin 25	Not connected	Pin 20	Not connected

4.6. Connection of the interface with the environment on the control and converter modules.

4.6.1. MCR control module- Environment interface
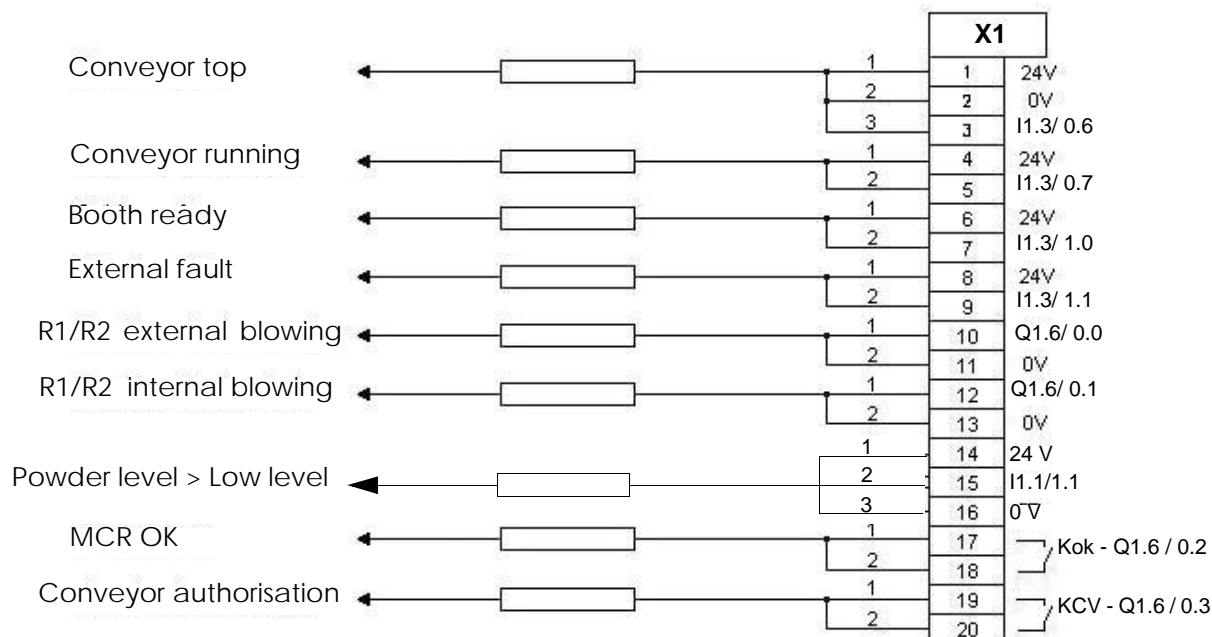
SAMES KREMLIN recommends the following cables:
- 3G1mm^2 (Ref: E2LAAC100)
- 4G1mm^2 (Ref: E2LAAD100)

The outputs actuate a dry contact.

Terminal box X1	Designation of Interface Inputs/Outputs
Pin 1	24V DC power supply
Pin 2	Common 0V
Pin 3	Conveyor top information input - I1.3 / 0.6
Pin 4	24V DC power supply
Pin 5	Conveyor operating information input - I1.3 / 0.7
Pin 6	24V DC power supply
Pin 7	Booth ready information input - I 1.3 / 1.0
Pin 8	24V DC power supply
Pin 9	External fault input - I 1.3 / 1.1
Pin 10	R1/R2 external Blowing - Q 1.6 / 0.0
Pin 11	Common 0V
Pin 12	R1/R2 internal Blowing - Q 1.6 / 0.1
Pin 13	Common 0V
Pin 14	24V supply
Pin 15	Powder level upper to the low level - I1.1/1.1
Pin 16	Common 0V
Pin 17	MCR output OK
Pin 18	MCR output OK
Pin 19	Conveyor authorisation output - Q 1.6 / 0.2
Pin 20	Conveyor authorisation output - Q 1.6 / 0.3

Conveyor pulses (pins 1,2 and 3)
Pins 1 and 2 supply the encoder or the inductive detector.
Pin 3 (input to MCR) receives the conveyor signal in pulses.
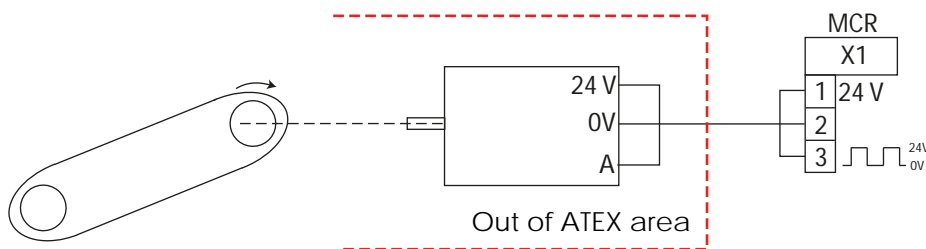
Examples:
Configuration N 1 : Incremental encoder
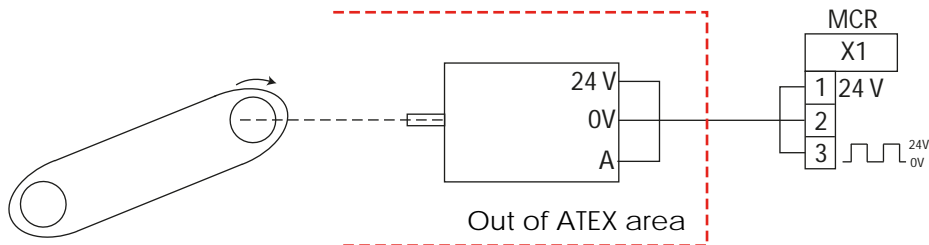
Configuration N 2 : Generating the encoder's signal in the conveyor cabinet.
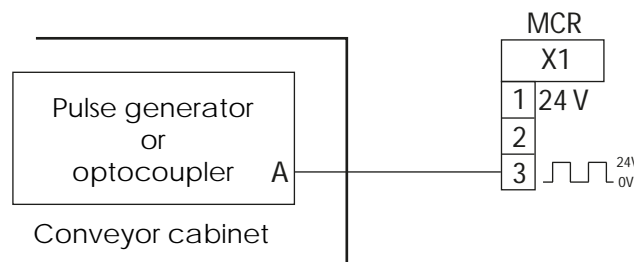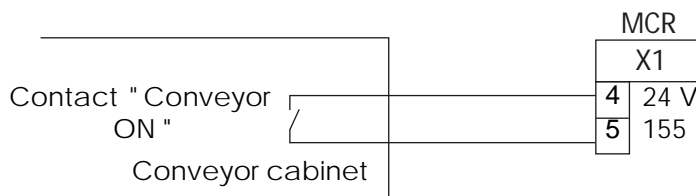

Configuration N 3: Inductive captor

Remark: We recommend to use a 3-wire technology captor, to avoid operating issues.
Conveyor running:
Pin 4 supplies the dry contact for the " Conveyor ON " information. Pin 5 (input to MCR) then receives the " conveyor ON " info if the contact is closed.. The Input logic may be reversed via the the operator console of the MCR (settings menu).

Thanks to this information and the conveyor's pulses, the MCR module knows the conveyor is actually running.

Booth ready:
Pin 6 supplies the dry contact for the " booth ready " information. Pin 7 (input to MCR) then receives the " booth ready " information if the contact is closed.The Input logic may be reversed via the operator console of the MCR (settings menu).
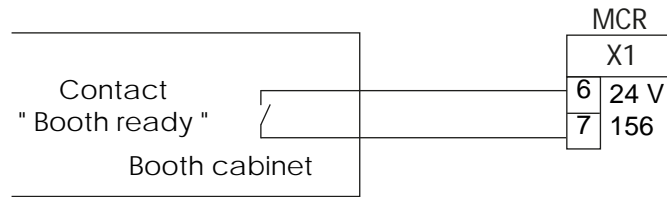
Thanks to this information , the MCR module knows the booth is actually running, and authorises spraying or induces a FAULT MCR.

External Fault:
Pin 8 supplies the dry contact for the " External Fault" information. Pin 9 (input to MCR) then receives the " External Fault " information if the contact is closed.The Input logic may be reversed via the operator console of the MCR (settings menu).
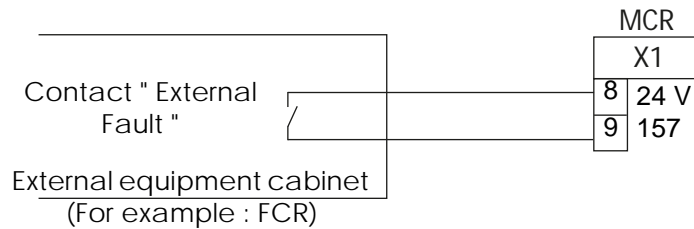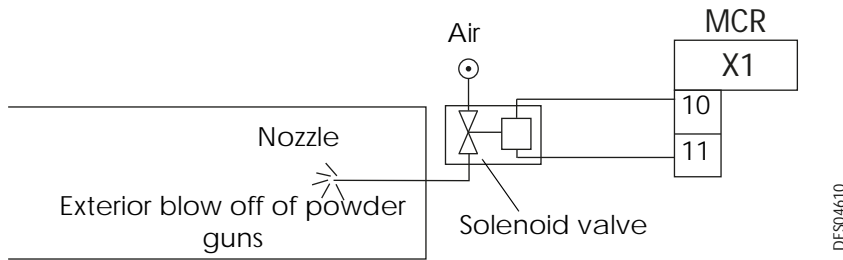
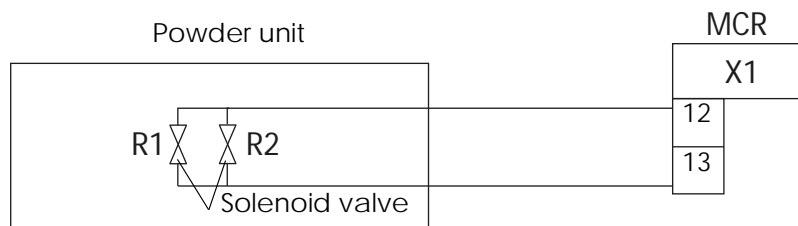Should the contact be closed, then a FAULT MCR is induced.

(1) External blow off/ (2) Internal blow off:
Pin 10 (or 12) (MCR outputs) sends a 24V voltage when the external blow off is activated. Pin 11 (or 13) is connected to the Common (0 V). The logic of the outputs may be reversed via the operator console of the MCR (settings menu).
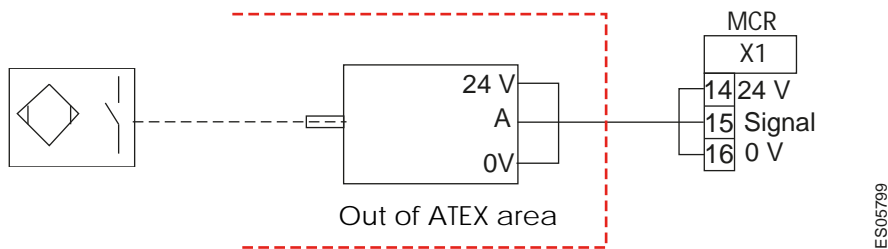
(1) External blow off:

(2) Internal blow off:

The external/internal blowing off function is common to robots R1/R2.
Exterior Blow off is actuated via the operator console of the MCR (cleaning menu).

Powder level sensor

Pins 14 and 16 supply the level sensor. Pin 15 (input MCR) receives the signal of the sensor .

MCR OK:
Pins 17 and 18 send the information " MCR OK " via a normally open dry contact (MCR output). This output is actuated if the MCR module is faulted.The output logic may be reversed via the operator console of the MCR (settings menu).
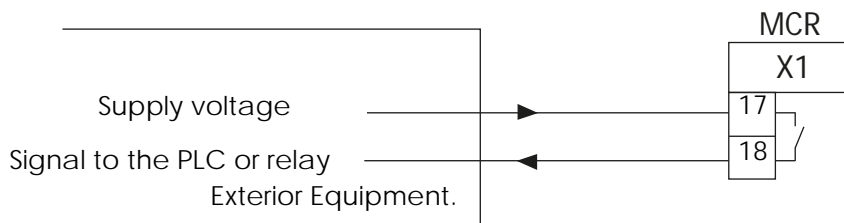
Authorization conveyor:
Pins 19 and 20 send the information " authorization conveyor " via a normally open dry contact (MCR output). The output logic may be reversed via the operator console of the MCR (Settings menu).

MCR
X1
Supply voltage ⟶ 19
Signal to the PLC or relay ⟵ 20
Conveyor cabinet
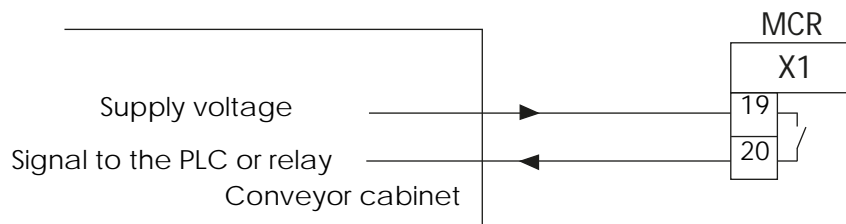
DES04611

Robotic version: if a CRN 457 or TCR module is faulty, the conveyor authorization signal will be deactivated.
The robot will have to stop its trajectory.
The trajectory and spraying will restart as soon as the fault signal is restored to the initial state.

4.6.2. MCR control module - Parts Detection
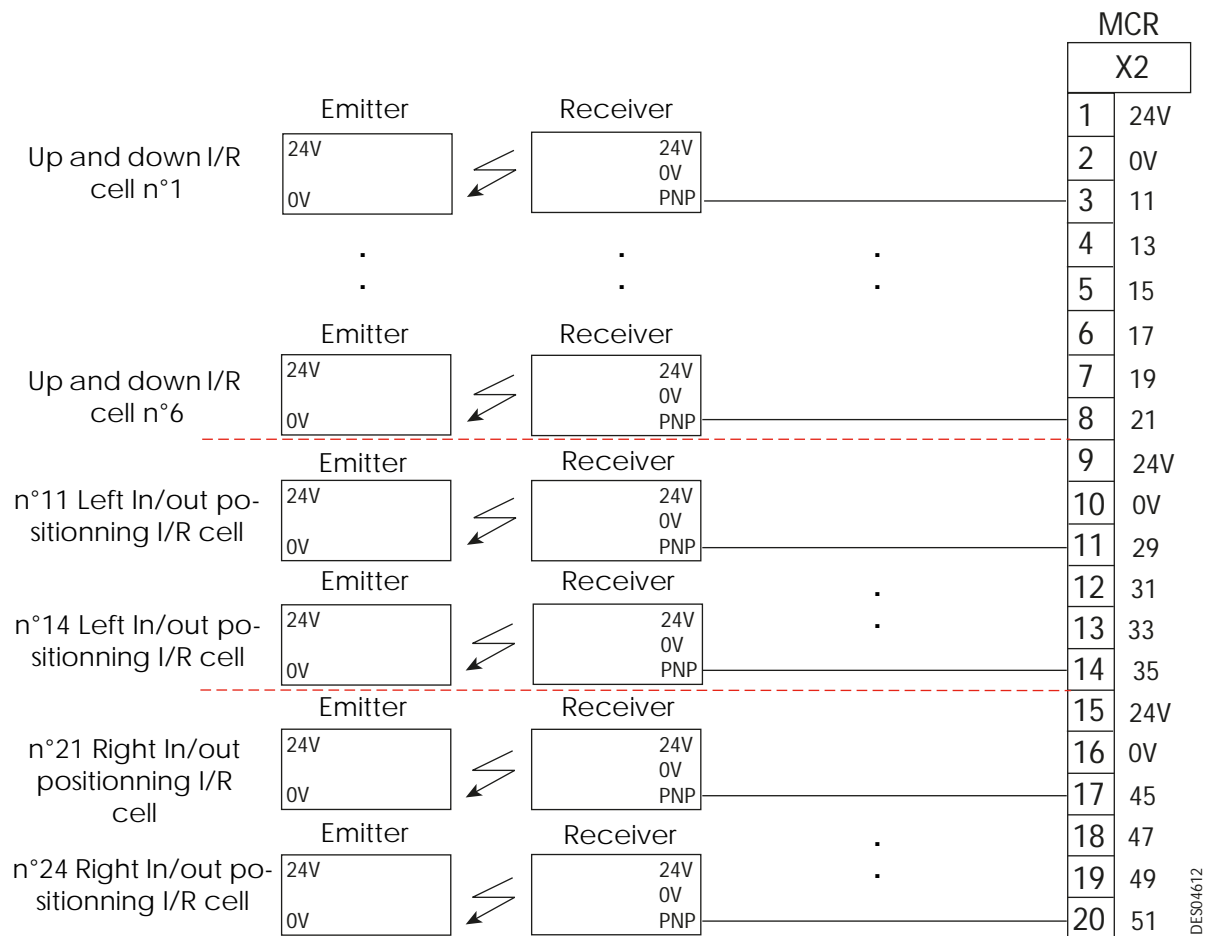
The MCR module's in/out positionning inputs are used to automatically move the RFV reciprocator width positionning axis to match the length of the parts to be coated.

The altitude inputs are used to automatically start spraying matching the height of the parts.

The N 1 up and down input is used to detect the presence of parts. The logic of the altitude inputs may be reversed via the operator console of the MCR module (Settings menu).

| Terminal box X2	Description	
	RFV Version	**Robotic Version**
Pin 1	24V DC supply	24V DC supply
Pin 2	Common 0V	-
Pin 3	N°1 up and down input	Trigger projector 1
Pin 4	N°2 up and down input	Trigger projector 2
Pin 5	N°3 up and down input	Trigger projector 3
Pin 6	N°4 up and down input	Trigger projector 4
Pin 7	N°5 up and down input	-
Pin 8	N°6 up and down input	-
Pin 9	24V DC supply	-
Pin 10	Common 0V	-
Pin 11	N°11 left in/out positionning input	-
Pin 12	N°12 left in/out positionning input	-
Pin 13	N°13 left in/out positionning input	-
Pin 14	N°14 left in/out positionning input	-
Pin 15	24V DC supply	-
Pin 16	Commun 0V	-
Pin 17	N°21 right in/out positionning input	-
Pin 18	N°22 right in/out positionning input	-
Pin 19	N°23 right in/out positionning input	-
Pin 20	N°24 right in/out positionning input	-

4.6.2.1. Part detection (Pins 1,2 et 3)
This detection is only triggered by the up and down N1 input.
Pins 1 and 2 supply power to the photoelectric or mechanical captor.
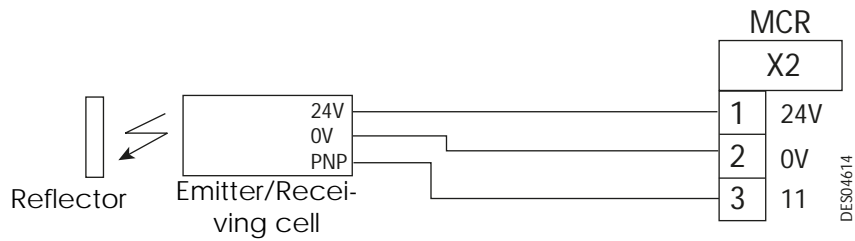Pin 3 (up and down N1 input) receives the parts detection signal.

Example:
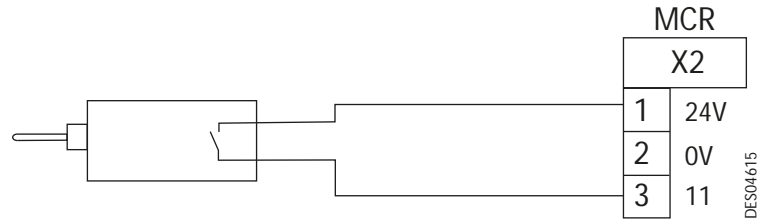**Configuration N°1: "Curtain"Type I/R cells**
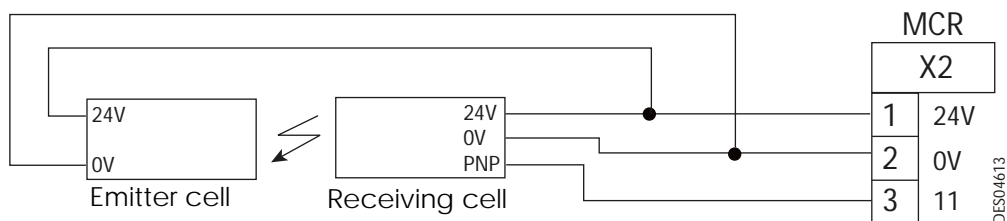
| Part number	Description
110000723	Emitter cell
110000722	Receiving cell
E2LDAB075	Cable 2 x 0,75 mm^2 for emitting cell
E2LDAC075	Cable 3 x 0,75 mm^2 for receiving cell

Configuration N°2: "Reflex"type I/R cell

Configuration N°3: rod lever detector

| Part Number	Description
E5NBFC026	Captor body
E5NBFC067	Captor head
E5NBFC068	Captor rod lever
E2LAAC100	Cable 3G 1 mm^2

We recommend the use of the " curtain " type I/R cells, as this system is less sensitive to pollutions or paint oversprays, as opposed to a " reflex " type. Also, with a I/R cell system, detection is less affected by the fluctuations of the hanging of parts than with a rod lever.

Robotic version:
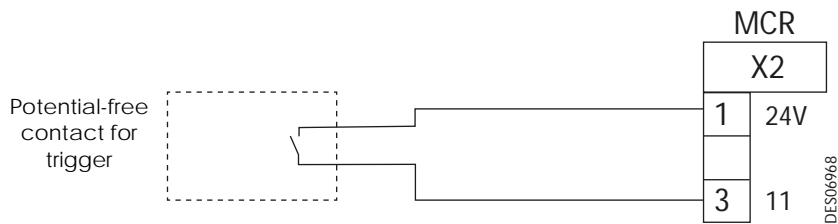
4.6.2.2. Parts detection - Up and down
Via I/R cells


Terminal box 8 I/R cells pairs
(Ref. : 1308266)
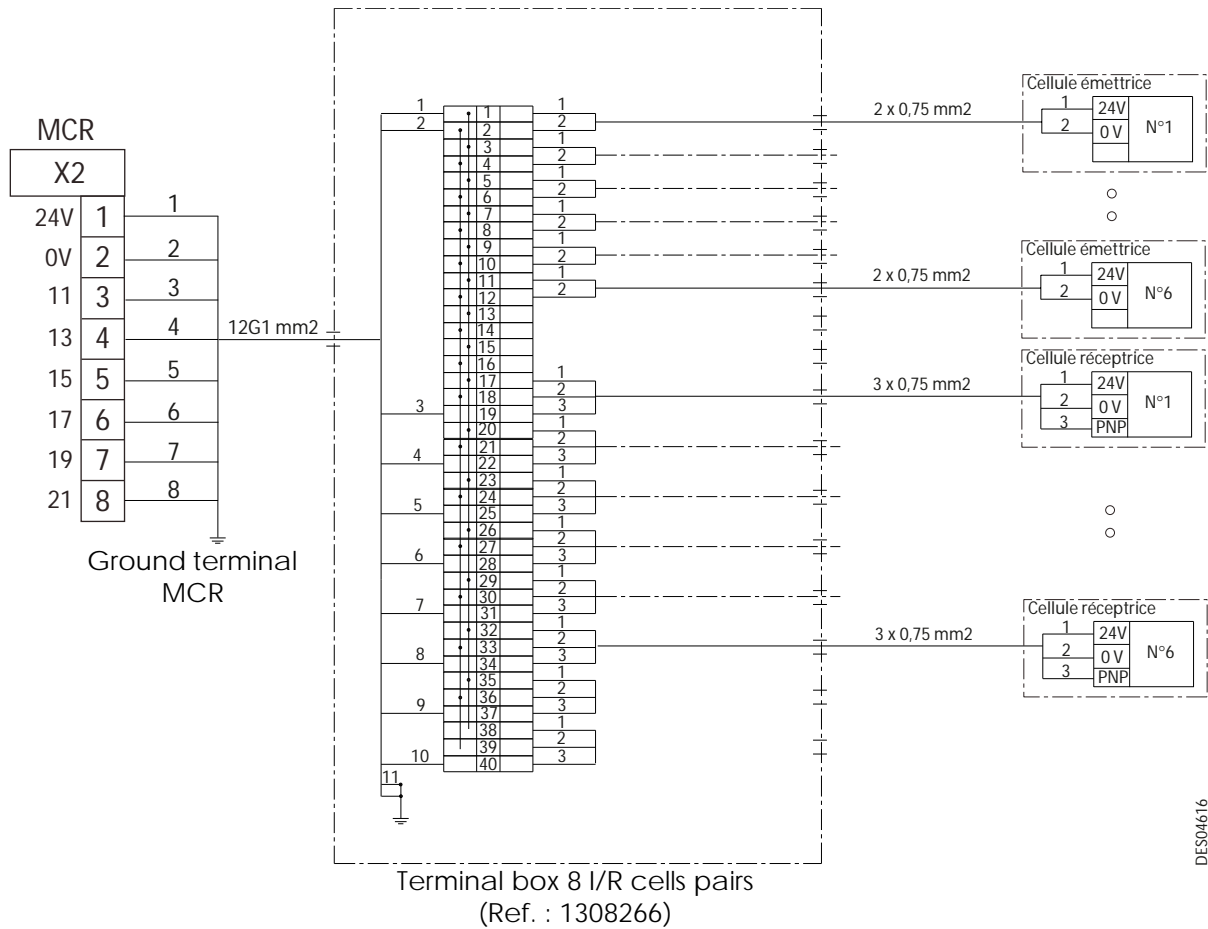
When a cell beam is broken, the guns associated to that cell (configuration menu) are automatically allowed to spray. The MCR module can handle up to 6 informations of altitude parts detection.
Cable Reference 12G1mm^2 : E2GABB100.

Note : if the number of altitude cells is less than, or equal to 4, one may use the terminal box P/N 1311999

Via curtain cells

Terminal box curtain cells
(Ref.: 1312002)
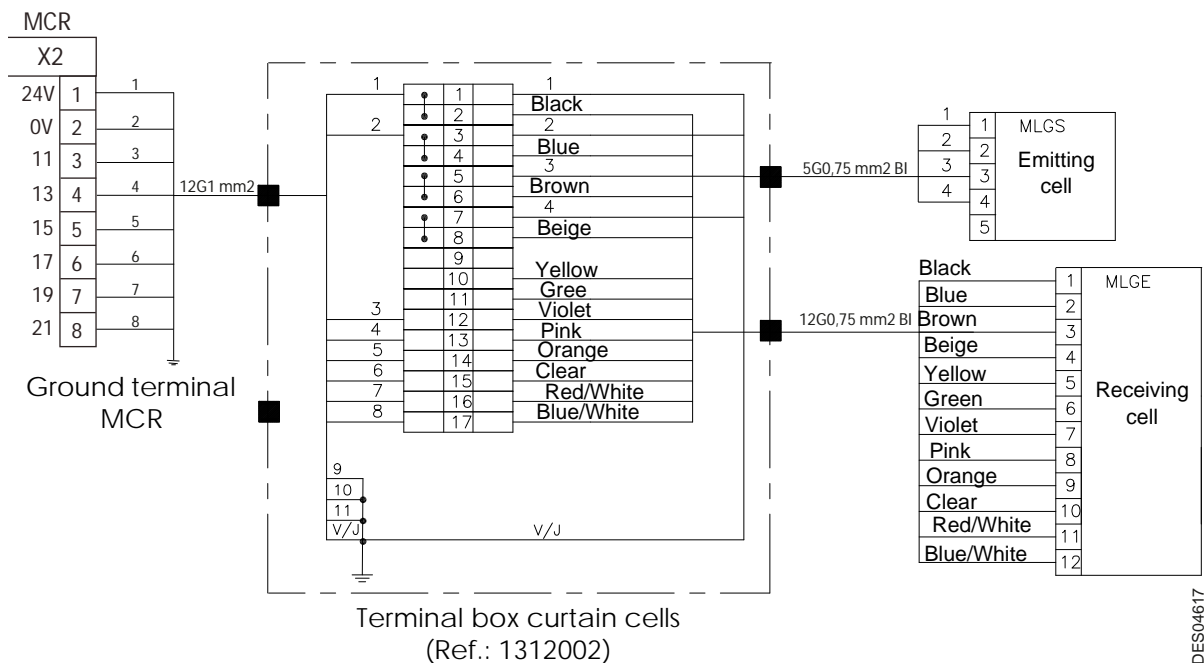
The use of a curtain cell system allows for a better parts detection as opposed to individual cells ; the resolution of the detection is smaller with the curtain (50mm, as a rule).

**WARNING :** **The configuration of the occultation zones is not managed by the MCR module. These parameters are handled via the curtain system programming software.**

Part Number	Description
E2BAAE075	Cable 5G 0,75 mm^2 shielded
E2NDBB025	Cable 12G 0,25 mm^2 shielded
Contact **SAMES KREMLIN**	Curtain cell
Contact **SAMES KREMLIN**	Programming cable for curtain cells

4.6.2.3. Parts detection - In and out
Via I/R cells

**Connection left
hand side**

**Terminal box 4 I/R cells pairs
(Ref.: 1311999)**
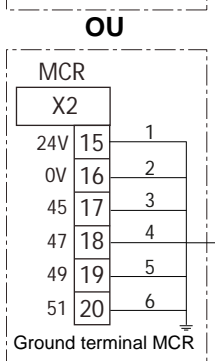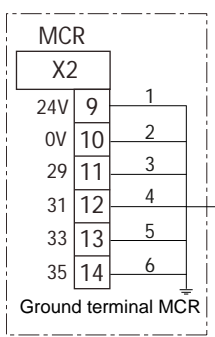
DES04605

**Connection right
hand side**
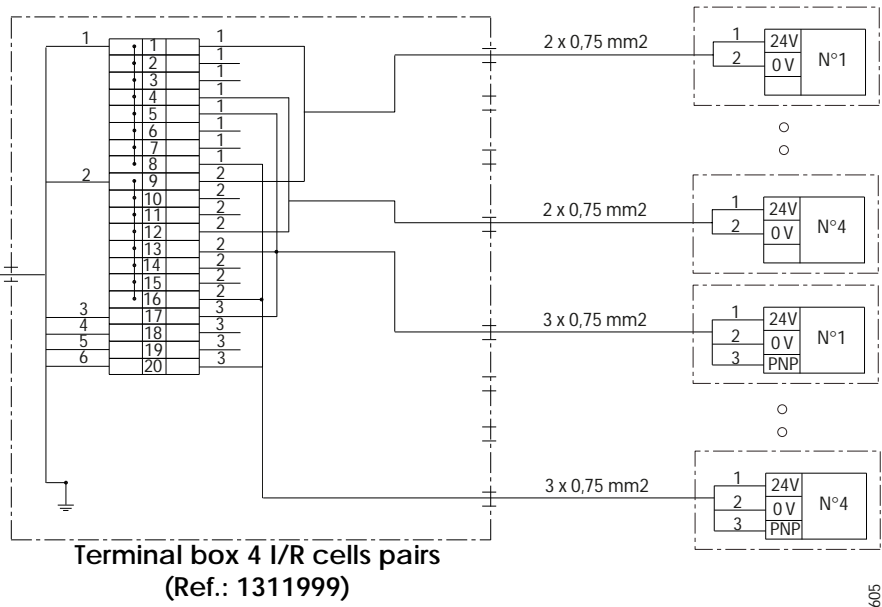
The principle of operation directs that as a cell beam is broken, the in/out axis moves automatically to the position pre-defined by the associated parameter in the configuration menu.
It results into an automatic adjustment of the in/out axis matching the length of the part. This on both the left and right hand sides.
The MCR module can handle up to twice 4 width of parts informations.
Cable Reference 7G1mm^2 : E2LAAG100.

Via curtain cells

Connection left hand side

MCR — X2

24V	9	1
0V	10	2
29	11	3
31	12	4
33	13	5
35	14	6

Ground terminal MCR

12G1 mm2

Terminal box curtain cells

Black
Blue
Brown
Beige
Yellow
Green
Violet
Pink
Orange
Clear
Red/White
Blue/White

V/J

5G0,75 mm2 BI

MLGS Emitting cell

12G0,75 mm2 BI

Black
Blue
Brown
Beige
Yellow
Gree
Violet
Pink
Orange
Clear
Red/White
Blue/White

MLGE Receiving cell

Terminal box curtain cells (Ref.: 1312002)

Connection right hand side

MCR — X2

24V	15	1
0V	16	2
45	17	3
47	18	4
49	19	5
51	20	6

Ground terminal MCR

12G1 mm2

Black
Blue
Brown
Beige
Yellow
Gree
Violet
Pink
Orange
Clear
Red/White
Blue/White

V/J

5G0,75 mm2 BI

MLGS Emitting cell

12G0,75 mm2 BI

Black
Blue
Brown
Beige
Yellow
Gree
Violet
Pink
Orange
Clear
Red/White
Blue/White

MLGE Receiving cell

Terminal box curtain cells (Ref.: 1312002)

DES04618

The resolution of the curtains cells used for in/out detection is generally 20mm.

⚠️ **WARNING : The configuration of the occultation zones is not managed by the MCR module. These parameters are handled via the curtain system programming software.**
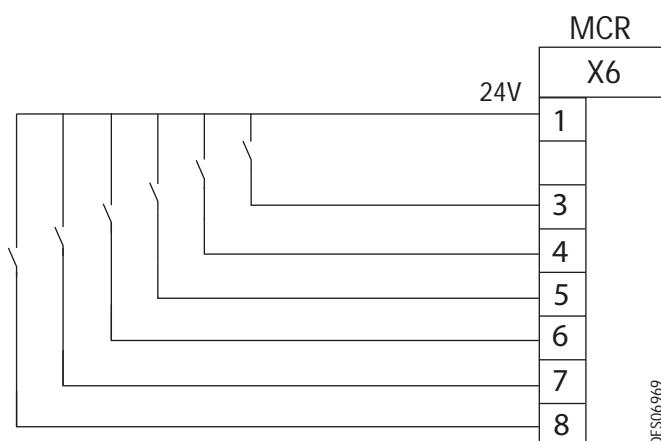
For part numbers of the curtains cells, refer to **SAMES KREMLIN**.

Connection module MCR - Robot cabinet - terminal box X6

Binary code reception between the robot cabinet and the MCR module.

| Terminal box X6	Description
Pin 1	24V DC supply
Pin 2	-
Pin 3	1 weight remote code
Pin 4	2 weight remote code
Pin 5	4 weight remote code
Pin 6	8 weight remote code
Pin 7	16 weight remote code
Pin 8	32 weight remote code

4.6.3. VCR converter module- Environment interface

The module takes account of the integration of an auxiliary emergency stop.

It therefore allows the power to the speed converters to be cut.

⚠️

WARNING : If this option is not used, a jumper strap must be added between terminal boxes 1 and 2, as well as between terminal boxes 3 and 4 and the X1 connector.
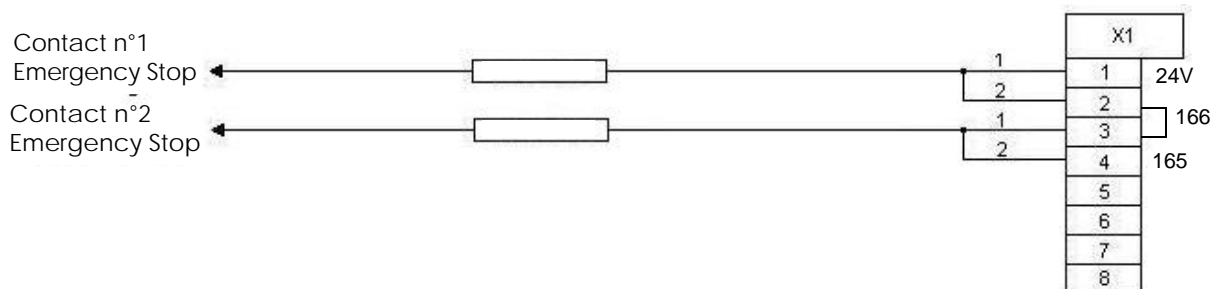
In the MCR module, the 2 contacts are in series. It is possible to connect 1 or both contacts depending on the level of safety required.

SAMES KREMLIN recommend the following cables:
- Cable reference 3G1mm^2 (Ref: E2LAAC100)

Terminal box X1	Designation of Interface Inputs/Outputs
Pin 1	Emergency stop input N°1
Pin 2	Emergency stop input N°1
Pin 3	Emergency stop input N°2
Pin 4	Emergency stop input N°2
Pin 5	
Pin 6	
Pin 7	
Pin 8	

5. Spare Parts

Reference	Designation	Qty	Unit of sale	Maintenance level for spart part (*)
910004516	MCR Control module	-	1	3
910004517	VCR converter module	-	1	3
110000524	Intermodule connection lead	-	1	3
130001239	Touch screen protection	-	1	2
E4PTRF590	20-pin connector for MCR	-	1	3
110000966	3-pin connector for MCR	-	1	3
110000967	8-pin connector (no 5mm) for VCR	-	1	3
110000968	8-pin connector (no 7,5mm) for VCR	-	1	3

(*)
Level 1: Preventive maintenance
Level 2: Corrective maintenance
Level 3 : Exceptionnal maintenance