Cables specifications

Inxpect SRE 100 and 200 Series

Revision	*Author*	*Date*	*Notes*
v01	B.Treachi	21/06/2018	Initial version
v02	B.Treachi	18/07/2018	Small changes
v03	B.Treachi	22/02/2019	Small changes
v04	B.Treachi	08/03/2019	Added caption to the connector pictures
v05	B.Treachi	01/04/2019	Added new lengths of the cable between sensors
v06	B.Treachi	11/07/2019	Added terminator resistor description
v07	I.Paderno	02/01/2020	Revised cable technical data, modified cable schemes, added chapter “length of cables”, added purchase products code
v08	I.Paderno	09/01/2020	Added example of connection with the controller, minor fixing
v09	L. Nava	04/03/2020	Added mandatory cable specifications
v10	B.Treachi	14/08/2020	Added ISC-B01 controller
v11	B.Treachi	12/02/2021	Added SBV System BUS
v12	B.Treachi	08/03/2021	Changed AWG codes and cables material
v13	B.Treachi	07/04/2021	Changed description of max length
v14	B.Treachi	07/04/2021	Changed example picture
v15	B.Treachi	29/04/2021	Changed colors for the new cables
v16	B.Treachi	12/04/2022	Renamed products, removed LBK System
v17	B.Treachi	10/10/2022	Changed max allowed length for 200 Series
v18	B.Treachi	25/10/2022	Added new cable length (20 m)
v19	B.Treachi	13/01/2023	Added new cable length (30 m). Removed old product names.
v20	B.Treachi	09/02/2023	Added new products, removed 30 m length cable.
v21	B.Treachi	17/01/2024	Reduced max CAN bus length for 200 Series to 80m
v22	B.Treachi	23/08/2024	Added new CU with CIP Safety protocol
v23	D. Roberti	20/01/2025	Updated Inxpect cables list and Part No.

v24	D. Roberti	06/02/2025	Updated example pictures
v25	B.Treachi	19/05/2025	Added new S202A sensor and new CU types
v26	B.Treachi	23/12/2025	Added new S202A-MCx types. Moved examples to the end of the document

1. Introduction

This document is related to *Inxpect SRE 100 Series* and *200 Series*.

For *LBK System*, please have a look at the respective documentation.

1.1 Control units

Both *Inxpect SRE 100* and *200 Series* use one of the following control units:

- Type A control units:
  - C201A-PNS / C201A-PX1
  - C201A-F / C201A-FX1
  - C202A / C202A-X1
  - C203A / C203A-X1
- Type B control units:
  - C201B-P / C201B-PX1
  - C201B-F / C201B-FX1
  - C201B-C
  - C202B / C202B-X1
  - C203B / C203B-X1

Please download the Instruction Manual from Inxpect Tools (https://tools.inxpect.com/) to have details about the differences between the control units.

1.2 Sensors

Each *100 Series* control unit can handle up to six S101A sensors.

Each *200 Series* can handle:

- up to six* "*200 Series*" sensors (S201A, S201A-W, S203A-W, S202A-MV, S202A-MS, S202A-MC1, S202A-MC2, S202A-MC4), or

- up to six "*200 Series 9m*" sensors (S201A-MLR, S201A-WL, S203A-WL)

* if at least one S202A sensor is connected, the maximum number of sensors handled by the Control Unit is 5 instead of 6.

Please download the Instruction Manual from Inxpect Tools (https://tools.inxpect.com/) to have details about the differences between the sensors.

1.3 Cables

Both *Inxpect SRE 100* and *200 Series* require the use of cables with specific features.

The following chapters describe the technical details of these cables.

2. Technical specifications

2.1 Cable technical data

2.1.1 Inxpect SRE 100 Series

The minimum requirements for the cables are the following:

- **Number of conductors:** 4 wires and 1 drain wire (or shield)
- **Conductor cross-sections (nominal):** 0.22 mm² (AWG24) for data signal and 0.22 mm² (AWG24) for power supply
- **Impedance:** 120 Ω ± 10% (f = 1MHz).

The recommended cable technical data are the following:

- **Signal type/category:** CAN bus, CANopen®, DeviceNetTM.
- **Number of conductors:** 4 wires (twisted pair) and 1 drain wire (or shield)
- **Conductor cross-sections (nominal):** 0.22 mm² (AWG24) for data signal and 0.34 mm² (AWG22) for power supply
- **Cable Material:** PVC (depending on final site of application)
- **Cable operating temperature:** from -20°C to +80°C
- **Impedance:** 120 Ω ± 10% (f = 1MHz).
- **Others specifications:** cable and connectors totally shielded with copper braid tin plated

2.1.2 Inxpect SRE 200 Series

The recommended cable technical data are the following:

- **Signal type/category:** CAN bus, CANopen®, DeviceNetTM.
- **Number of conductors:** 4 wires (twisted pair) and 1 drain wire (or shield)
- **Conductor cross-sections (nominal):** 0.22 mm² (AWG24) for data signal and 0.50 mm² (AWG21) for power supply
- **Cable Material:** TPU (depending on final site of application)
- **Cable operating temperature:** from -20°C to +80°C
- **Impedance:** 120 Ω ± 10% (f = 1MHz).
- **Others specifications:** cable and connectors totally shielded with copper braid tin plated

2.2 Length of the CAN bus cables

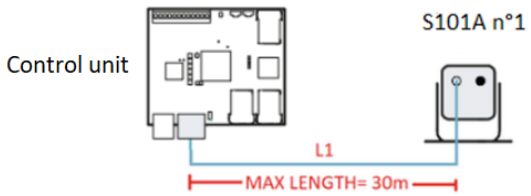
2.2.1 Inxpect SRE 100 Series

The maximum cable length allowed is 30 metres for each bus line (maximum two bus lines allowed), regardless of the conductor section of the CAN bus cable.

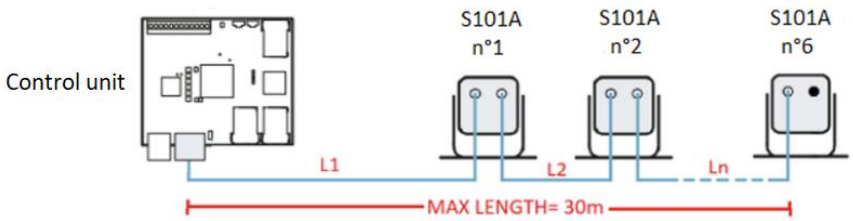
This value can be reached with a cable only or with multiple cables in case of multiple S101A sensors installed (chain of sensors). In other words, the sum of all the cables used in a single bus line does not have to exceed the maximum length allowed.

Examples:

- Only a sensor installed

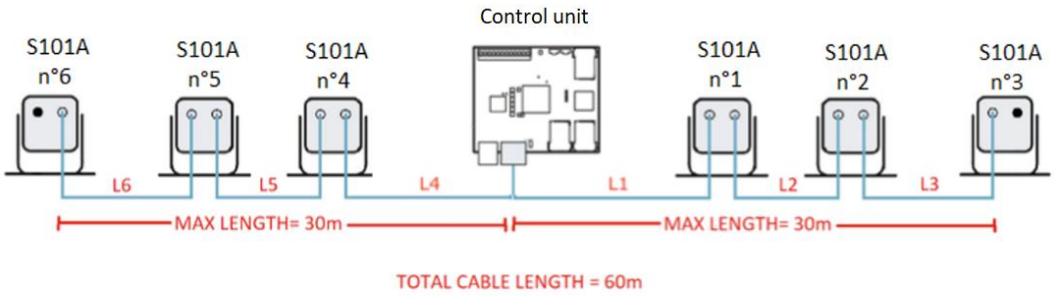


- Multiple S101A on the same bus line (chain of sensors)



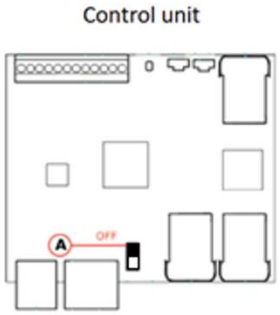
The sum of the length of each cable must be equal or lower than 30 metres. ($\sum_1^6 \quad Ln \leq 30m$)

- Multiple sensors in two different bus lines with the control unit inside of the chain **(*)**



The sum of each cable's length on the same bus line must be equal or lower than 30 metres, and the overall length must be at maximum 60 metres. ($\sum_1^n \quad Ln \leq 30m \; and \; \sum_n^6 \quad Ln \leq 30m$, where n <6). Each bus line may have between 1 and 5 sensors. The maximum number of S101A sensors managed by a single control unit is 6.

(*) When the control unit is inside of the chain, it is necessary to exclude the termination resistance on the control unit itself using the DIP Switch "A".



2.2.2 Inxpect SRE 200 Series

The maximum length allowed of the whole CAN bus line (from termination to termination) is 80 metres, regardless of the conductor section of the CAN bus cable.

A maximum number of two bus lines is allowed. Then, the sum of the length of the two lines must be lower than (or equal to) 80 metres.

Please use the *Inxpect SRE 200 Series Cable Validator* tool to check and validate your desired cable configuration.

The tools is going to request the following parameters:

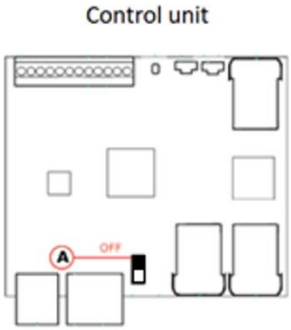
- number of BUS lines
- number of sensor for each line
- length of each cable*
- Power Supply cable section**

* See sections 3.1.2 and 4.1.2 to know the standard lengths provided by Inxpect

** Standard cables provided by Inxpect have a power supply section of 0.50 mm² (AWG21)

Each bus line may have between 1 and 5 sensors. In case at least one S202A sensor is connected, between 1 and 4 sensors.

When the control unit is inside of the chain, it is necessary to exclude the termination resistance on the control unit itself using the DIP Switch “A”.



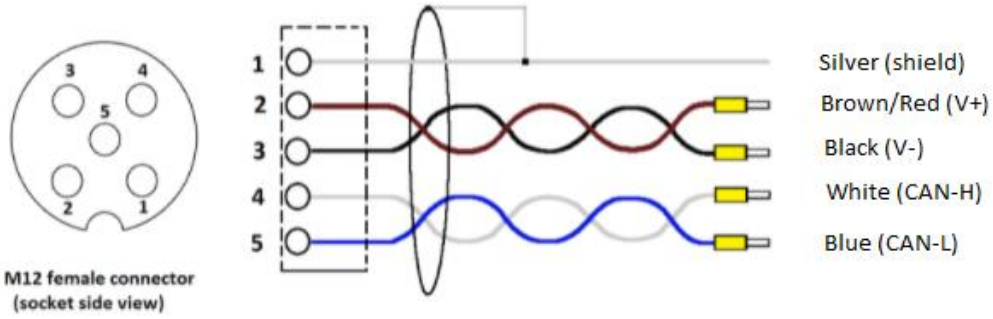
3. Cable between the control unit and the first sensor

The cable between the control unit and the first sensor must have an M12 female connector “A-coded” to plug into the first sensor, and free wires to plug in the control unit screw terminal.

The connector may be straight or 90° angled. In case of installation with the sensor anchored to a vertical plane the 90° angled version is suggested (example: wall installation).

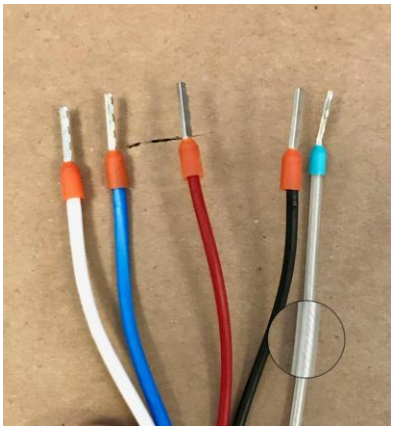
Example picture:

In the case of purchased cable from Inxpect the cable schematics and colour association are the following.

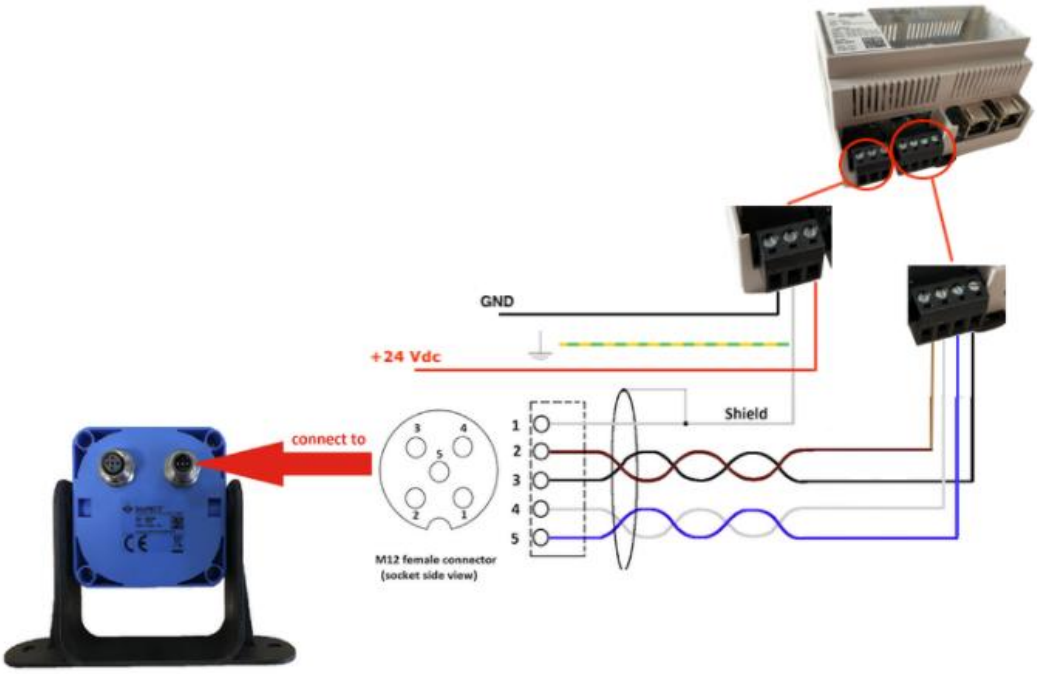


Notes:

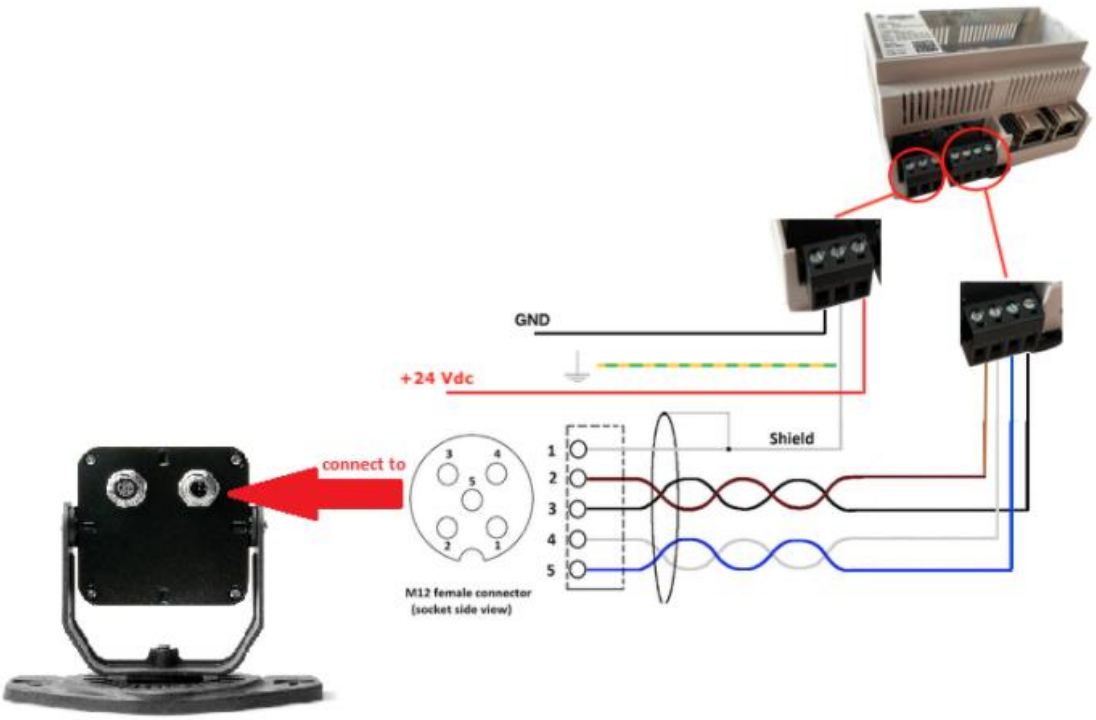
- the shield wire must be connected to EARTH in the electrical cabinet
- in Inxpect cable with conductor section of 0.50 mm² (AWG21) for power supply, a light-blue cap is present at the end of the shield wire to better distinguish it from all the other wires.



Example of connection of C201A-PNS control unit with an S101A sensor:



Example of connection of C201A-PNS control unit with S201A sensor:



3.1 Product purchase code for the cable between control unit and first sensor

3.1.1 SRE 100 Series sensor

It is possible to order the following lengths of cable from Inxpect:

Image	Purchase Code	Length	Description
	08000004	10 metres	cable between sensor and control unit, PVC, connector M12 90° angled, A-coded
	08000006	15 metres	

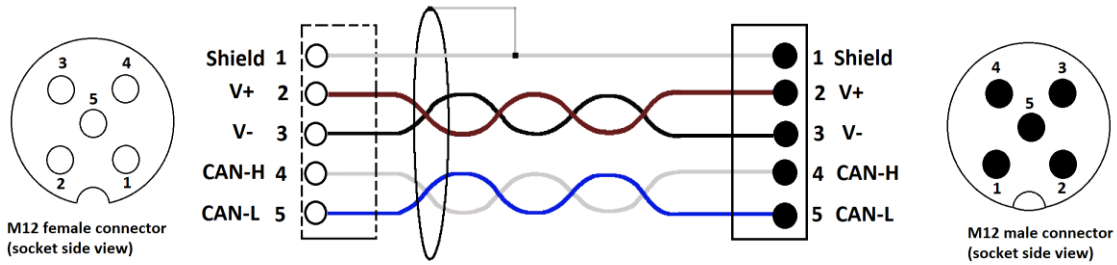
3.1.2 SRE 200 Series sensor

It is possible to order the following lengths of cable from Inxpect:

Image	Purchase Code	Length	Description
	08000110	5 metres	cable between sensor and control unit, TPU, connector M12 90° angled, A-coded
	08000111	10 metres	
	08000112	15 metres	
	08000113	20 metres	

4. Cable between two sensors

The cable between two sensors (both SRE 100 Series or both SRE 200 Series) has the following schematic



Example picture

4.1 Product purchase code for the cable between two sensors

4.1.1 SRE 100 Series sensor

It is possible to order the following lengths of cable from Inxpect:

Image	Purchase Code	Length	Description
	08000007	3 metres	cable between a sensor and another sensor, PVC, connectors M12 90° angled, A-coded
	08000012	5 metres	
	08000017	15 metres	

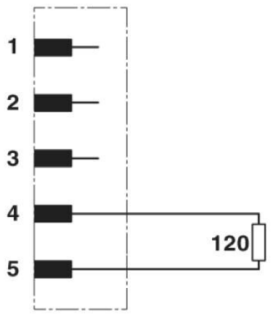
4.1.2 SRE 200 Series sensor

It is possible to order the following lengths of cable from Inxpect:

Image	Purchase Code	Length	Description
	08000126	1 metre	cable between a sensor and another sensor, TPU, connectors M12 90° angled, A-coded
	08000120	3 metres	
	08000121	5 metres	
	08000122	10 metres	
	08000123	15 metres	

5. Bus terminator

For the last sensor in the CAN bus a termination resistor of 120 Ω must be installed between the signals CAN_H and CAN_L, as indicated in the following picture.



It is possible to order an M12 male connector A-coded including the bus terminator resistor.

Image	Purchase Code	Description
	07000003	Bus terminator M12, straight 180°, male, 5 poles, A-coded. 1 resistance of 120Ω 1/2W between pole 4 and 5.

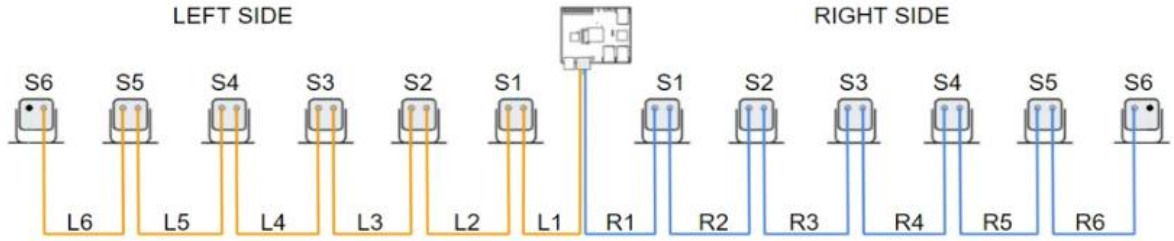
6. Examples (*Inxpect SRE 200 Series*)

6.1 Example 1

Multiple sensors on the same bus line (chain of sensors), a **valid** configuration

In the following example we have:

- number of BUS lines: 1
- number of sensor for each line: 3
- length of each cable: 10+5+10 [m]
- Power Supply cable section: 0.50 mm²



Enable desired configuration — Left Side ☑ — Right Side ☐

Sensors used	S6	S5	S4	S3	S2	S1
	☐	☐	☐	☑	☑	☑

Sensors used	S1	S2	S3	S4	S5	S6
	☐	☐	☐	☐	☐	☐

Cables Length (meters)	L6	L5	L4	L3	L2	L1
				10	5	10

Cables Length (meters)	R1	R2	R3	R4	R5	R6

Cable section: 0,5 mm2

Total cable length	25	m
Max Power consumption	10,74	Watt
Average Power consumption	6,93	Watt
Voltage on last sensor	11,45	Volt

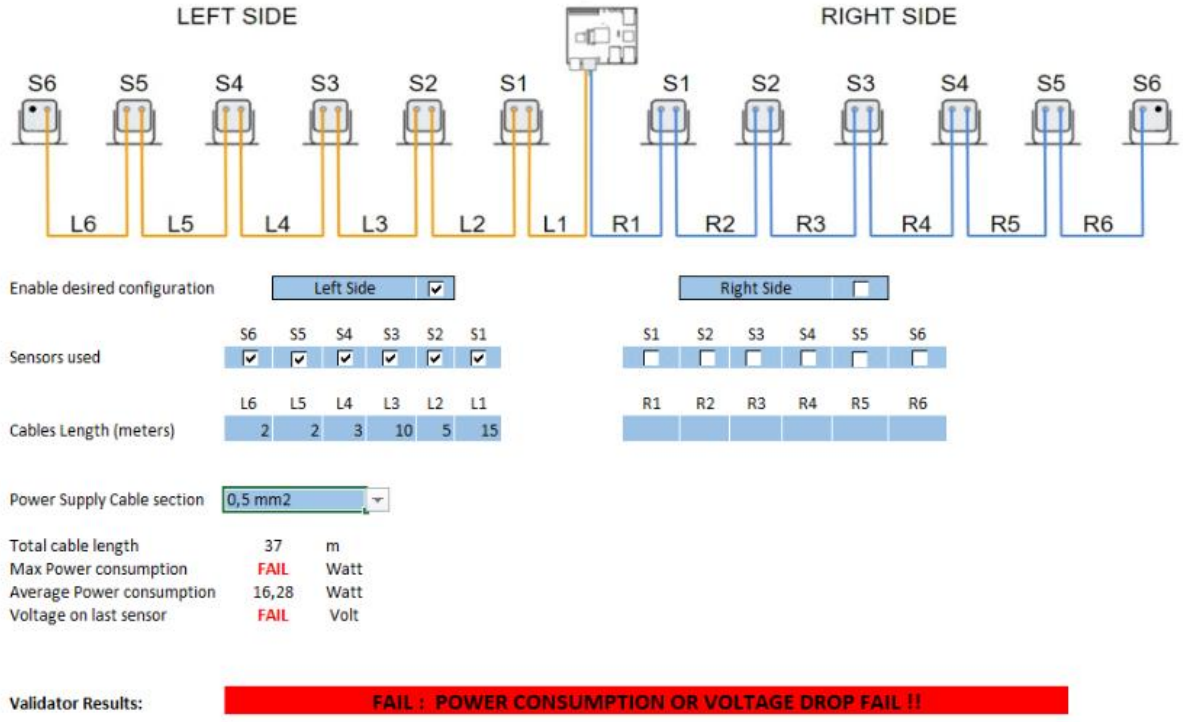
Validator Results: INSTALLATION VALIDATED

6.2 Example 2

Multiple sensors on the same bus line (chain of sensors), a **not valid** configuration

In the following example we have:

- number of BUS lines: 1
- number of sensor for each line: 6
- length of each cable: 15+5+10+3+2+2 [m]
- Power Supply cable section: 0.50 mm²

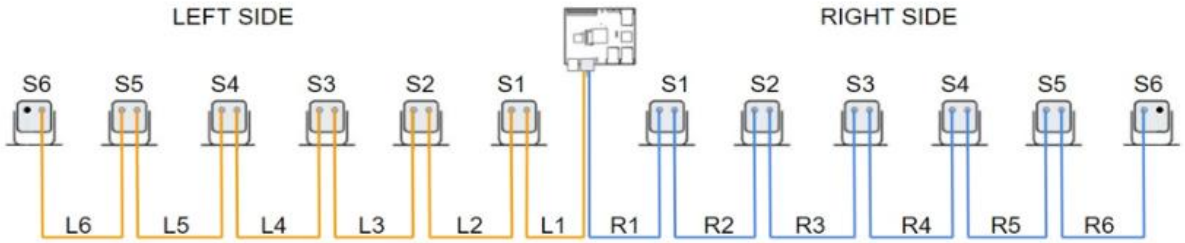


6.3 Example 3

Multiple sensors in two different bus lines with the control unit inside of the chain, a **valid** configuration

In the following example we have:

- number of BUS lines: 2
- number of sensor for each line: 3+3
- length of each cable: 10+5+10 [m] and 5+5+5 [m]
- Power Supply cable section: 0.34 mm²



Enable desired configuration	Left Side ☑						Right Side ☑						
	S6	S5	S4	S3	S2	S1	S1	S2	S3	S4	S5	S6
Sensors used	☐	☐	☐	☑	☑	☑	☑	☑	☑	☐	☐	☐
	L6	L5	L4	L3	L2	L1	R1	R2	R3	R4	R5	R6
Cables Length (meters)				10	5	10	5	5	5			

Power Supply Cable section	0,34 mm2	
Total cable length	40	m
Max Power consumption	21,91	Watt
Average Power consumption	14,01	Watt
Voltage on last sensor	10,79	Volt

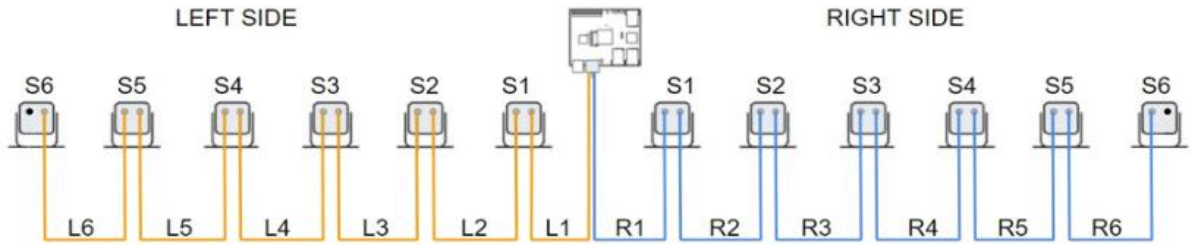
Validator Results: **INSTALLATION VALIDATED**

6.4 Example 4

Multiple sensors in two different bus lines with the control unit inside of the chain, a **not valid** configuration

In the following example we have:

- number of BUS lines: 2
- number of sensor for each line: 4+2
- length of each cable: 15+5+7+10 [m] and 10+5 [m]
- Power Supply cable section: 0.34 mm²



Enable desired configuration	Left Side ☑							Right Side ☑					
	S6	S5	S4	S3	S2	S1		S1	S2	S3	S4	S5	S6
Sensors used	☐	☐	☑	☑	☑	☑		☑	☑	☐	☐	☐	☐
	L6	L5	L4	L3	L2	L1		R1	R2	R3	R4	R5	R6
Cables Length (meters)			10	7	5	15		10	5				
Power Supply Cable section	0,34 mm2												
Total cable length	52	m											
Max Power consumption	25,56	Watt											
Average Power consumption	15,03	Watt											
Voltage on last sensor	FAIL	Volt											
Validator Results:	**FAIL : POWER CONSUMPTION OR VOLTAGE DROP FAIL !!**												