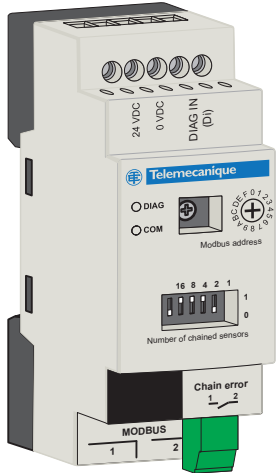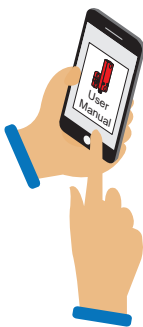## Diagnostic Module

The diagnostic module interprets the diagnostic data of the whole chain of **XCSRC•2M12** connected in series, and makes this information available into Modbus registers. It identifies which guards are opened or closed, prevents a new start of the machine in case of malfunctioning in the daisy-chain.

Note: you can download the complete User Manual in different languages from our website at: **www.tesensors.com**

en N°: QGH1315301
fr N°: QGH1315302
de N°: QGH1315303
es N°: QGH1315304
it N°: QGH1315305
pt N°: QGH1315306

http://qr.tesensors.com/XCS015

Scan the Qr-code to access the complete User Manual

We welcome your comments about this document. You can reach us by e-mail at: **customer-support@tesensors.com**

⚠ WARNING

IMPROPER UTILIZATION

Do not use the Diagnostic module as a safety equipment. Diagnostic function is not part of safety function

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ WARNING

IMPROPER CONNECTION

The diagnostic module, every XCSRC•2M12, and the safety control unit must be powered by the same SELV / PELV power supply. The power supply must meet the requirements of **IEC 60204-1**. The SELV Schneider Electric part number: **ABL8RPS24•••**

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Description
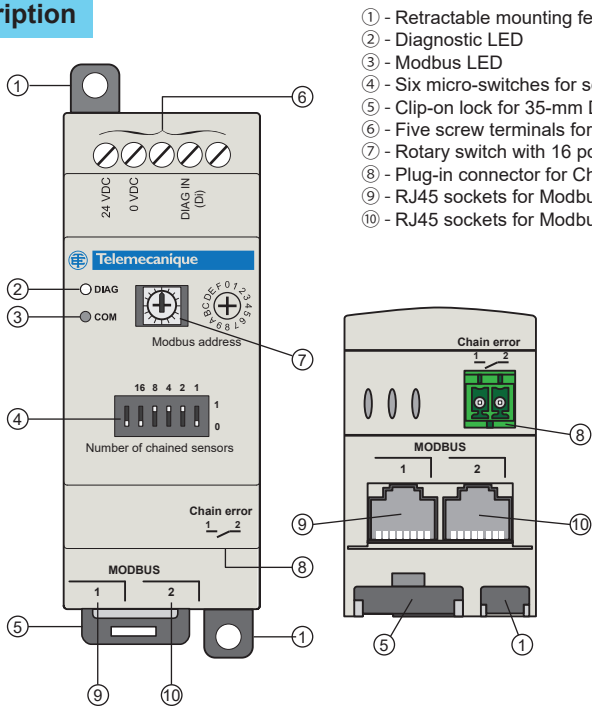

① - Retractable mounting feet (panel mounting)
② - Diagnostic LED
③ - Modbus LED
④ - Six micro-switches for setting the number of XCSRC•2M12 connected in series
⑤ - Clip-on lock for 35-mm DIN-rail
⑥ - Five screw terminals for electrical wiring and the diagnostic signal (Inputs / Power supply Wiring)
⑦ - Rotary switch with 16 positions for setting the Modbus address
⑧ - Plug-in connector for Chain Error (free potential contact) - (CE *(1)*: Chain Error contact / ESC: External Start Condition).
⑨ - RJ45 sockets for Modbus communication.
⑩ - RJ45 sockets for Modbus communication.

(1): CE does not provide information to stop the machine and is not part of the safety function.
CE opens in the following cases:
• During the initialization state,
• In error state
Otherwise, CE is closed.
Once opened, CE cannot be closed until next power-up and restart cycle (if the configuration and the number of switches are consistent and if the XCSRC•M12 are not in fail conditions).
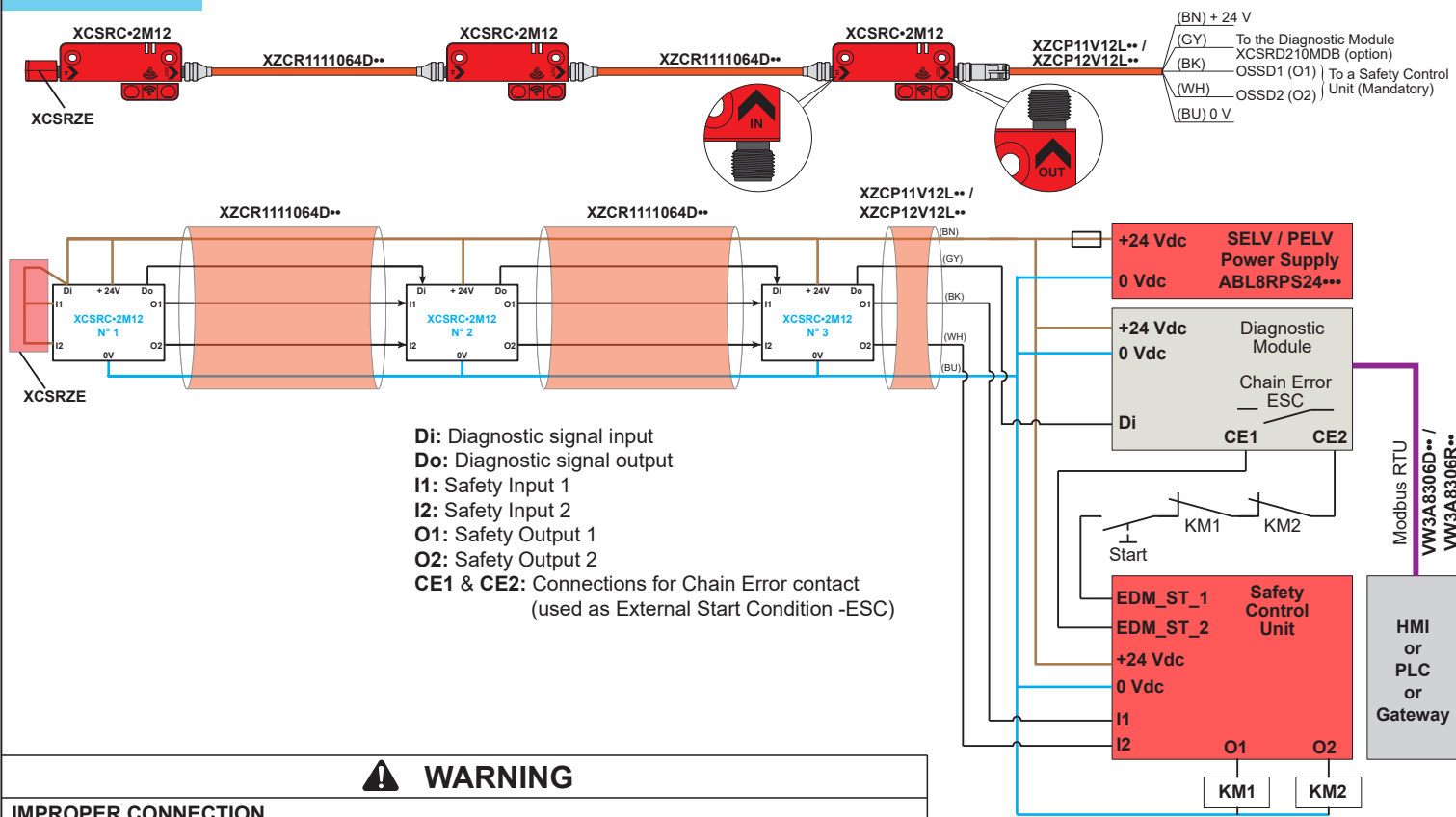
Dimensions

Mounting

Click!

2 x M4

1 Nm
8.9 lb/in

Printed in

XCSRD210MDB
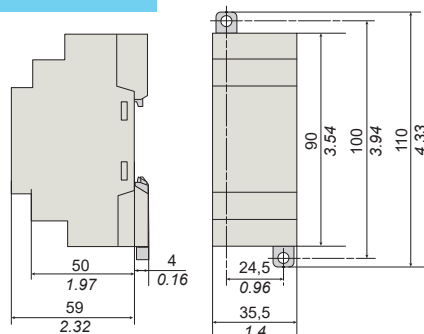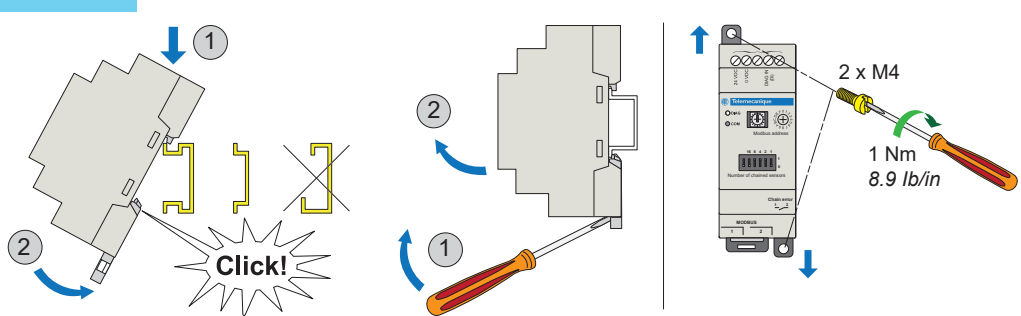
Connections

Pin out	Description
①	+ 24 Vdc
②	0 Vdc
③	Not Connected
④	DIAG IN (Diagnostic signal input)
⑤	Not Connected

mm / inch	6 / 0.24				Nm	0,5
					lb-in	4
mm²	0,25…3,5			Ø 3,5 mm (0.14 in)	Nm	0,2
AWG	24…12				lb-in	1.7

Pin out	Description
①	CE1
②	CE2

RJ45 port

Pin N°	
1	Not Connected
2	Not Connected
3	Not Connected
4	D1
5	D2
6	Not Connected
7	Output (+ 5 Vdc)
8	Common (0V)

Wiring diagram

Di: Diagnostic signal input
Do: Diagnostic signal output
I1: Safety Input 1
I2: Safety Input 2
O1: Safety Output 1
O2: Safety Output 2
CE1 & CE2: Connections for Chain Error contact
(used as External Start Condition -ESC)

XCSRC•2M12   XZCR1111064D••   XCSRC•2M12   XZCR1111064D••   XCSRC•2M12   XZCP11V12L•• / XZCP12V12L••

XCSRZE

(BN) + 24 V
(GY) — To the Diagnostic Module XCSRD210MDB (option)
(BK) — OSSD1 (O1) — To a Safety Control Unit (Mandatory)
(WH) — OSSD2 (O2)
(BU) 0 V

IN / OUT

+24 Vdc / 0 Vdc — SELV / PELV Power Supply ABL8RPS24•••

+24 Vdc / 0 Vdc / Di — Diagnostic Module / Chain Error ESC / CE1 CE2

KM1 KM2 / Start

EDM_ST_1 / EDM_ST_2 / +24 Vdc / 0 Vdc / I1 / I2 — Safety Control Unit — O1 O2

KM1 KM2

Modbus RTU VW3A8306D•• / VW3A8306R•• — HMI or PLC or Gateway

⚠ WARNING

IMPROPER CONNECTION

Controller or external display must be powered by the RJ45 (pin 7&8, Modbus CP5S).

Failure to follow these instructions can result in death, serious injury, or equipment damage.

LEDs States

Diagnostic LED (DIAG) Description

State	Color	Description
OFF	-	No diagnostic data received or no detected error or power OFF.
ON	Orange	Initialization state.
ON	Green	Run state: Correct diagnostic data frame received.
ON	Red	Error state: • Inconsistency between the number of XCSRC•2M12 physically connected in series and the value set on the micro-switches. • The number of XCSRC•2M12 chained is greater than 20. • XCSRZE Loopback device not connected. • At least one XCSRC•2M12 is in failure mode. • Detection of cable disconnection.

Modbus LED (COM) Description

State	Color	Description
OFF	-	No Modbus data received or no detected error or power OFF.
ON	Orange	Initialization state: Modbus auto baudrate detection function.
Blinking	Green	Run state: Correct Modbus data frame received.
Blinking	Red	Error state: Incorrect Modbus data frame received.

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Diagnostic Module - Modbus Registers

A) Modbus Protocol

Main feature: The communication of the diagnostic data to a controller or an external display.

The only supported Modbus request is Read holding registers (code 03h).
The Modbus protocol is Remote Terminal Unit (RTU).

NOTE: Connection to a Modbus TCP/IP device is possible with the use of EGX150 gateway. Refer to the Modbus TCP/IP wiring example (next page).
The detection of the Modbus line configuration is automatic. The automatic detection is activated after a power-up during the initialization phase. The duration of the initialization phase is 5 s.

B) Modbus Registers

| Address	Register	Word	Description	Bit used
0x0000	1	Word 0	Error description	0…4
0x0001	2	Word 1	State of the first sixteen XCSRC•2M12	0…15
0x0002	3	Word 2	State of the last four XCSRC•2M12	0…3
0x0003	4	Word 3	Position of cable disconnection or XCSRC•2M12 in failure mode.	0…4
0x0004	5	Word 4	Number of XCSRC•2M12 in the chain set on the micro-switches.	0…4

Diagnostic Module Operating

A) Installation State

1 Configure the Modbus slave address with the rotary switch (the address 0 is reserved).

You can set the Modbus address at any time and during any operating mode. There are 15 possible Modbus addresses (1…15).

2 Configure the number of XCSRC•2M12 present on the safety chain with the micro-switches:

Number of chained sensors
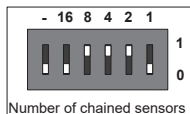
This value must be set before powering-up the product. Example: the value set on the picture above is 14(dec), binary code equal to: 1110 = 8 + 4 +2.

3 Wire the diagnostic module.

4 Power up the diagnostic module.

B) Initialization State

During this state:
• The two LEDs are orange
• The contact Chain Error is opened
At power-up, the following initialization steps are automatically performed:

1 Acquisition of the number of XCSRC•2M12 on the chain set on the micro-switches.

Note: Once in operation, the micro-switches cannot be changed. The micro-switch changes are taken into account after a power cycle only. If you change this value, the diagnostic module falls into error.
This error is blocking and a restart is mandatory.
To change this value, power off the module, reconfigure it and then restart.

2 Acquisition of the Modbus slave address set previously on the rotary switch.

Note: You can set the Modbus address at any time and during any operating mode.

3 Modbus register initializations (by default).

4 The diagnostic module goes to Run state.

C) Run State

This step follows the initialization step of diagnostic function and Modbus function.
At each reception of diagnostic data, Modbus registers are updated.

Diagnostic function:
If no diagnostic frame is received within a timeout of 3 s or diagnostic frame are incorrect, the diagnostic module enters in error state.
The error suppression and a new start are necessary to leave the error state.
The status of the diagnostic function is indicated by the diagnostic LED.
For more details, refer to the Diagnostic LED description.

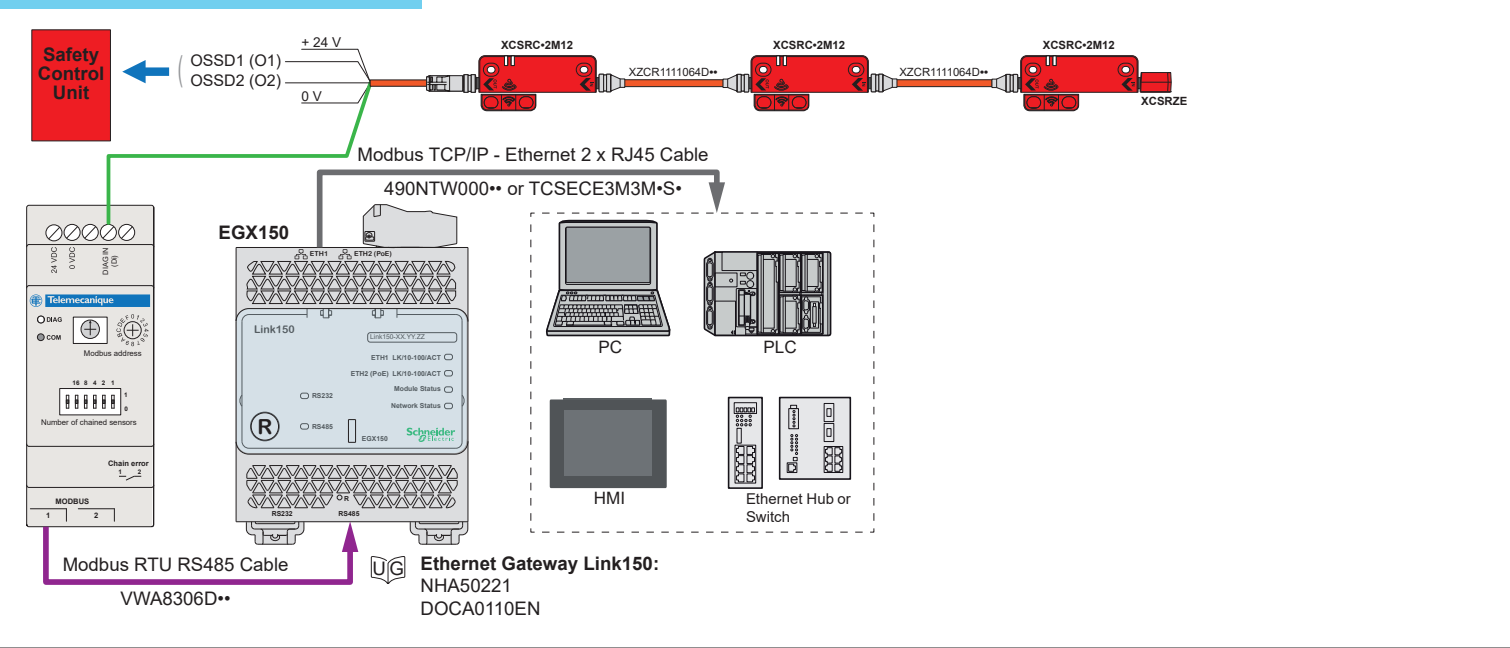**Modbus function (Modbus line configuration detection):**
The reception of a Modbus frame is indicated by flashing of Modbus LED.
In case of Modbus communication detected error, no restart is required. If the detected error is canceled, the communication resumes automatically.
A Modbus detected error never affects the state of Chain Error contact.
For more details, refer to the Modbus LED description.

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Modbus TCP/IP Wiring Example

Modbus TCP/IP - Ethernet 2 x RJ45 Cable
490NTW000•• or TCSECE3M3M•S•

Modbus RTU RS485 Cable
VWA8306D••

Ethernet Gateway Link150:
NHA50221
DOCA0110EN

Diagnostic Module Characteristics

Approvals		CE, cULus, EAC, RCM
Conforming to standards		**EN 60947-1**, **EN 61326-2-1**, **UL 508**, **CSA C22.2**
Power supply		The power supply must meet requirements of **IEC 60204-1** relative to SELV / PELV power supply.
Operating supply voltage		+24 Vdc (+10%, -20%) = [+19.2 Vdc, +26.4 Vdc]
Power consumption		≤ 300 mA
Power on delay		< 5 s
Reverse polarity protection		Yes (excluding RJ45)
Input signal		Compatible with **XCSRC•2M12** diagnostic signal.
Protection		External fuse
Relay	Type	Mechanical
	Current	< 200 mA
	Voltage	+24 Vdc
	T$_{ON}$	1 ms / 3 ms
	T$_{OFF}$	1 ms / 3 ms
Output power (RJ45)	Voltage	+24 Vdc
	Current	< 200 mA
EMC immunity withstand		Conforming to **EN 61326-2-1**
Degree of protection		IP20
Shock resistance		15 gn / 11 ms Conforming to **EN/IEC 60068-2-27**
Vibration resistance		Conforming to **EN/IEC 60068-2-6**: +/- 3.5 mm (0.138 in) 5...8.4 Hz / 1 g (8.4...150 Hz)
Impact		IK04 Conforming to **IEC 62262**
Temperatures	Operating	0…60 °C *(32…140 °F)*
	Storage	-40…+85 °C *(-40…185 °F)*

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