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Data: 19/04/2021
Miejsce: Szczecin

Remote relay control system
Mark: ST-PPSG-1.0-16CH

1. Description

ST-PPSG-1.0-16CH Remote relay control system is designed to forward input state from one place to output state in another using only 8 wires for 16 channel operation. Advanced fail safe system, along with relay output control allows ST-PPSG-1.0-16CH to be used in safety critical applications like: emergency shutdown, engine controls, hydraulic controls and other industrial environment.

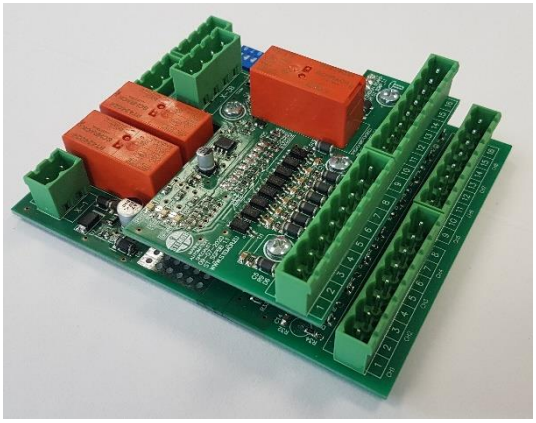

Figure 1 Input board

System is composed of 2 devices:

a. Input board (SGPBB) – main board which receives input signals, manages communication and monitors system power. This unit is made of STEMOR signaling column driver board (SGKP) with additional auxiliary board mounted on top to extend operation to 16CH and 2xRS485,

b. Output board (PPSG) – slave board which controls 16 individual relays, powered from SGPBB

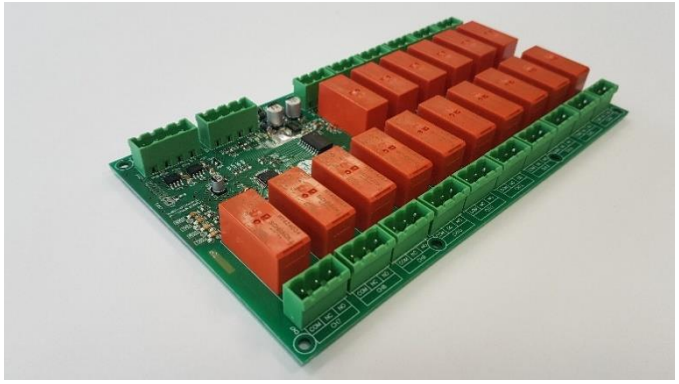

Figure 2 Output board

ST-PPSG-1.0-16CH is designed for 24VDC supply. It can operated safely in range of 17-34V, but fault indication occurs if voltage drops below 18V or rises above 32V. In case of overvoltage of 34V (absolute maximum rating 36V). Inputs are optically isolated and requires external power to trigger channels powered from 24VAC/DC. Both boards communicate using two RS485 independent lines with power monitoring. Outputs are SPDT relay type with operation indication and control.

System is intended to be installed in an electric cabinet using included DIN mounting shrouds.

2. Operation Principle.

During normal operation the input board periodically, and alternatively on both lines, transmits its status to the output board which in turn decodes the received data and responds with own status using the line through which communication was achieved. When the input board detects a change

in input signal the CPU interrupt routine begins: first it detects which input was enabled, then prepares new data frame with updated status and sends it on both communication lines simultaneously. The output board receives the data and toggles corresponding relays to mirror the input board's signals, it also checks if proper relay is switched on and responds with own updated status. Propagation time of signal is typically 20ms.

Each unit checks local supply voltage and when it is out of range (less than 18V or more than 34V) fault status is enabled. When a unit does not receive any communication from the other one for 2 seconds fault status will also be enabled. During the fault condition red LED will start blinking according to table 1. The device also monitors both communication lines' timeout, power delivery and fault status of the other board.

System is fully functional with only one communication and power line, eg. if one line fails, data transmission remains uninterrupted.

Blink count	Input Board	Output Board
1		POWER CH1 FAILURE
2		POWER CH2 FAILURE
3	COMM CH1 TIMEOUT	COMM CH1 TIMEOUT
4	COMM CH2 TIMEOUT	COMM CH2 TIMEOUT
5		RELAY FALURE
6	REMOTE UNIT FAILURE	REMOTE UNIT FAILURE
7	POWER FAILURE UVP	POWER FAILURE UVP
8	POWER FAILURE OVP	POWER FAILURE OVP

Table 1 Fault LED blink count decode table

3. Technical specification.

SGPBB (input) board specification:

Mechanical specification:

Height : 60mm
Length: 118mm
Width: 94mm
Mount: Din rail 35mm, Miniature top-hat rail 15mm

Electrical specification:

Supply voltage: 24V DC (18V-34VDC)
Idle current: 250mA
Active current: 300mA + 20mA per active channel

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PPSG (output) board specification:

Mechanical specification:

Height :	40mm
Length:	118mm
Width:	220mm
Mount:	Din rail 35mm, Miniature top-hat rail 15mm, 7x M3 screw

Electrical specification:

Supply voltage:	24V DC (20V-32VDC)
Idle current:	power from SGPBB

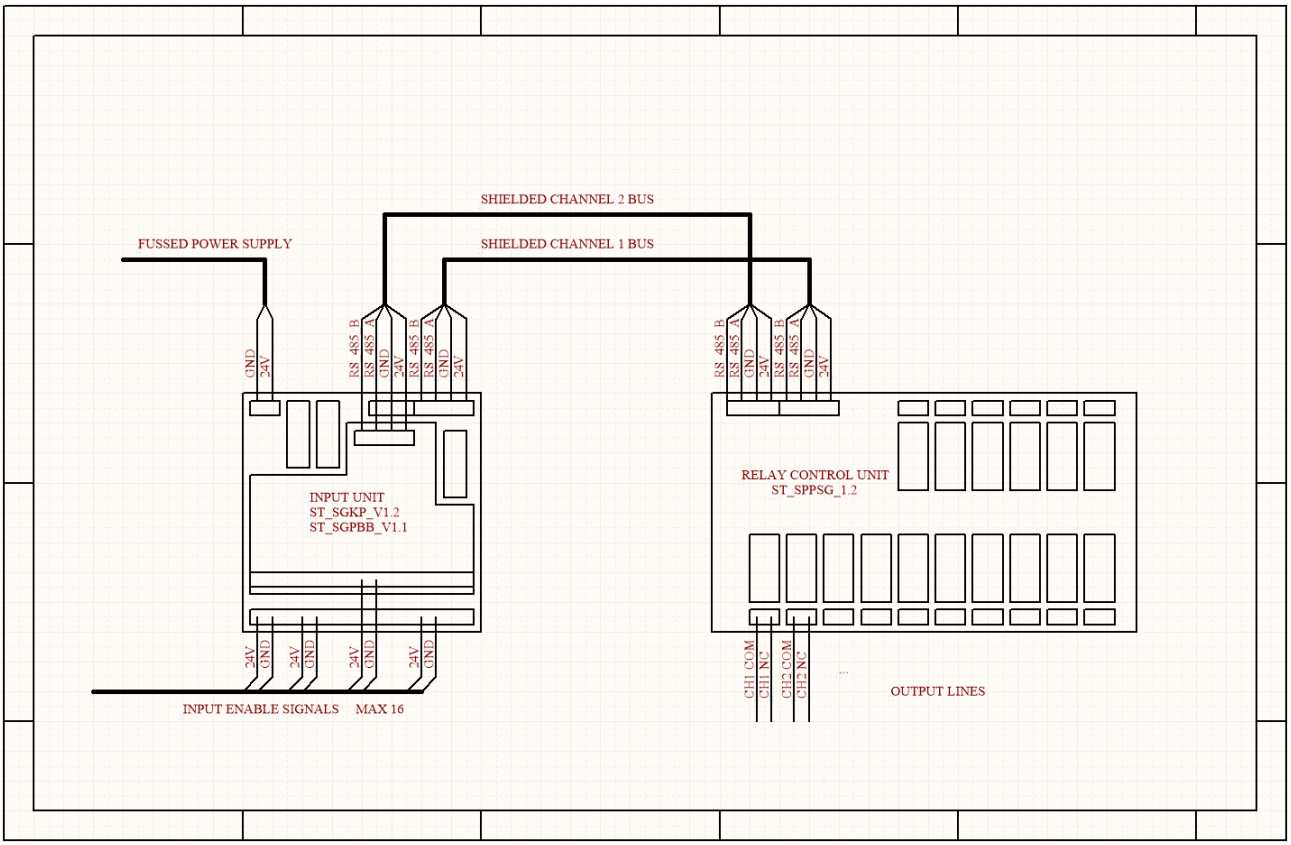

Figure 3 System external connection

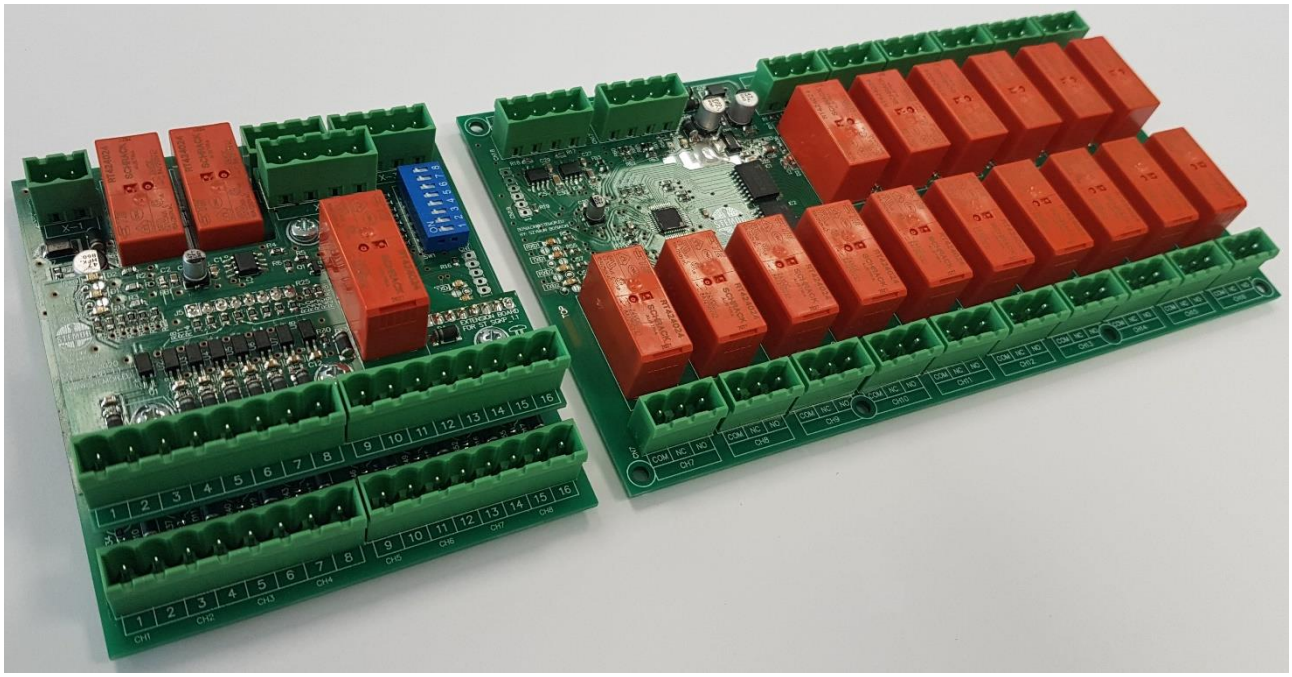

Figure 4 System boards overview

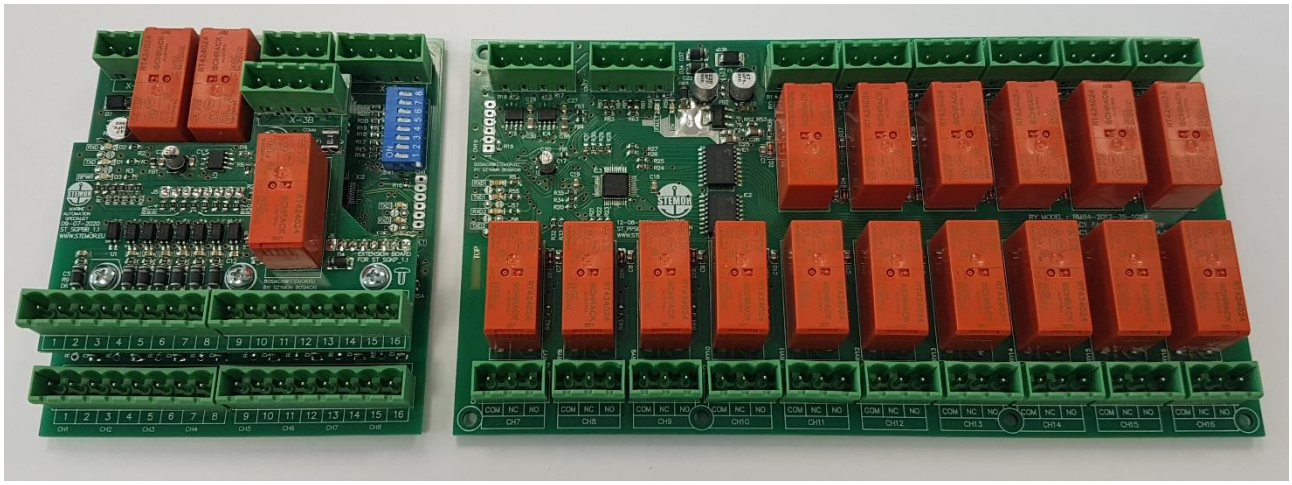

Figure 5 System board overview

Input board schematic:	Appendix 1 ST-SGKP-1.2 Schematic.PDF
Input board PCB:	Appendix 2 ST-SGKP-1.2 PCB.PDF
Input expander board schematic:	Appendix 3 ST-PPSG-1.2 Schematic.PDF
Input expander board PCB:	Appendix 4 ST-PPSG-1.2 PCB.PDF
Output board schematic:	Appendix 5 ST-SGPBB-1.1 Schematic.PDF
Output board PCB:	Appendix 6 ST-SGPBB-1.1 PCB.PDF

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Ver. 1.0 07-09-2020 – first edition