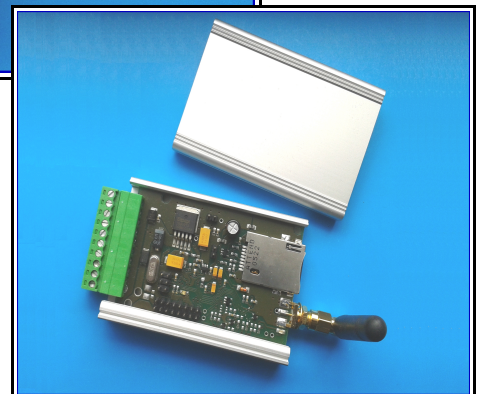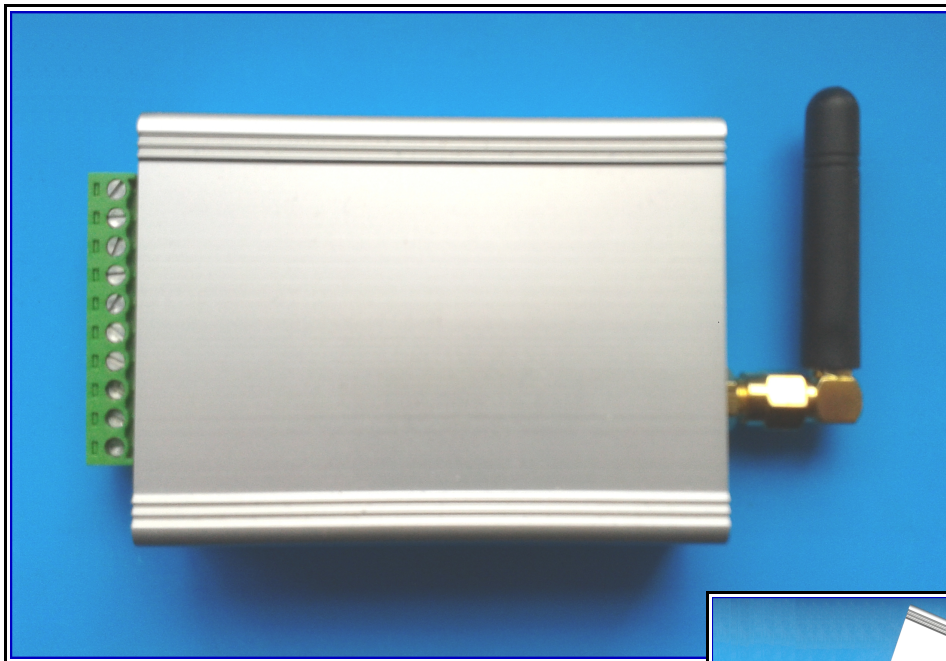Biene Electronics
www.bieneelectronics.com

GSM controller module
for SMS remote monitoring, alarming and control applications

BR900-GATE

Preliminary data

Introduction

The BR900-GATE controller is a low dimensions low cost GSM communications device that used for wireless gste open equipment control. The built-in GSM module compatible with quad-band (850/900/1800/1900Mhz) GSM networks. Up to 250 user can gate open with call to BR900-GATE7

Features

- Quad band GSM module SIM800 or compatible (2G GSM 850/900/1800/1900Mhz)
- 4 digital inputs
- Internal voltage monitoring
- Output 1 - Gate Open output
- On-board power supply voltage monitoring
- Remote programming using SMS
- User definable input alarming text descriptions
- Pluggable screw terminal block for external signal connections
- Push-Push SIM holder
- External stabilised +6...12VDC (14.5V max)
- Board dimensions: 50.5x77.5mm
- Enclosure: FISCHER ELEKTRONIK AKG 55 24 80 ME (optional)

Output Control

BR900-Gate has 2 open-drain Outputs. These may be controlled with SMS messages. To set any output, you need only to send an SMS message.
For Gate control – call to module from phone. Relay output – output for Gate automation device control. Abonent numbers can write to EEPROM and SIM card with SMS command.

Alarm

SMS messages can be sent to users when an input reaches an alarm state. The following setpoint configurations are available:
Alarm when 0-1 or 1-0 event at digital input.
Alarm when above set point for internal voltage.
Alarm when below set point point for internal voltage.
Alarm when inside set points point for internal voltage.

Module Programming/Configuration

The BR900 can be configured (programming) remotely with SMS command.

GSM module BR900-ST

Technical Specification

BR900 series Hardware Specification

	BR900-ST	BR900-SMT	BR900-RF	BR900-GATE	BR900-GPS	BR928-DL
GSM band support	2G GSM 800/850/1800/1900Mhz					
Internal GSM module	Quad band GSM module SIM800 or compatible					
RF Transmit Power	Class 4 (2W) 850/900Mhz, Class 1 (1W) 1800/1900Mhz					
Data transmission	SMS	SMS	SMS	SMS	SMS/FTP/GPRS	SMS/FTP/GPRS
SIM card reader	Push-push					Simple
SIM card type	Phase 1 and phase 2+; SIM 3V / 1.8V					
Antenna Connection	50Ω SMA (f) Connector					
Digital inputs						
Digital inputs type	MOSFET transistor input (20V max)					Darlington transistor input
- Digital inputs	4	2	1	4	4	6
- Events digital inputs	4	2	1	4	4	12
- Digital inputs event	0-1 or 1-0	0-1 or 1-0		0-1 and 1-0	0-1 and 1-0	0-1 and 1-0
- Digital signal filter	yes	no	no	no	no	yes
Temperature sensor inputs						
Temperature sensor	-	SMT160-30	-	-		SMT160-30
Temperature inputs	-	2	-	-		2
Temperature input events	-	min/norm/max	-	-		min/norm/max
Temperature range	-	-45 to +99°C	-	-		-45 to +99°C
Accuracy	-	1.7°C (1.5°C)	-	-		1.7°C (1.5°C)
- Temperature filter		Yes				Yes
Analogue inputs						
Analogue inputs	1	1	-	-	1	3
Analogue input range	0...10V	0...10V	-	-	0...10V	0-10V
Analogue input mode	-	-	-	-	-	0-5V/0-10V 0-20mA (optional)
- Analogue input events	min/norm/max	min/norm/max	-	-	min/norm/max	min/norm/max
- ADC resolution	10-bit	10-bit	-	-	10-bit	10-bit
Outputs						
- Relay Output	-	-	-	-	-	1 (125Vac/24Vdc/0.5A
- Solid State Relay outputs	1 (optional) (30V/1A max)	1 (optional) (30V/1A max)	-	1 (optional) (30V/1A max)	1 (optional) (30V/1A max)	-
- MOSFET Open Drain outputs	2 (optional) (30V) optionally instead of Solid-State Relay output	2 (optional) (30V) optionally instead of Solid-State Relay output	-	2 (optional) (30V) optionally instead of Solid-State Relay output	2 (optional) (30V) optionally instead of Solid-State Relay output	2 (20V)
- Wireless Outputs (AC remote switch control)	-	-	Up to 5			-
- Output control mode	On-Off; Pulse					
On-board monitoring						
Power supply voltage monitoring	Yes	Yes	Yes	Yes	Yes	Yes
Power supply voltage monitoring range	15.5V max	15.5V max	15.5V max	15.5V max	15.5V max	17.75V max
Temperature monitoring	-	-	Yes	-	-	-
Temperature range	-	-	-40 to +85°C	-	-	-

3

GSM module BR900-ST

	BR900-ST	BR900-SMT	BR900-RF	BR900-GATE	BR900-GPS	BR928-DL
Wiring						
Wiring Connections	10-way Pluggable Screw Terminal block	10-way Pluggable Screw Terminal block	5.5/2.1 power connector; 2 way pluggable screw terminal	10-way Pluggable Screw Terminal block	10-way Pluggable Screw Terminal block	2x10-way Double row pluggable Screw Terminal block
Power Supply						
Required Power External Supply	+6..12Vdc (14.5Vdc max) stabilised	+5Vdc stabilised	+5Vdc stabilised	+6..12Vdc (14.5Vdc max) stabilised	+6..12Vdc (14.5Vdc max) stabilised	+12Vdc stabilised (+11Vdc min +14.5Vdc max)
Power requirement	50mA typ, 250mA(rms) max, 2A peak typ. (3A max) peak during transmission					
Minimum current recommended	1.2A	1A	1A	1.2A	1.5A	1.5A
Voltage regulator	Internal voltage regulator					
Power protection	Reverse-polarity and over-voltage protection					
Environmental Conditions						
Operating temperature range	-40…+85°C					
Dimensions						
Board dimensions	77.5x50.5mm					
Enclosure	optional	optional	Yes	optional	optional	optional
Enclosure	aluminium	aluminium	aluminium	aluminium	aluminium	aluminium
Enclosure dimensions	80x55x24mm	80x55x24mm	80x55x24	80x55x24mm	80x55x24mm	80x55x32

BR900 series Firmware Specification

	BR900-ST	BR900-SMT	BR900-RF	BR900-GATE	BR900-GPS	BR928-DL
Quantity of controlled outputs	1 (2)	1 (2)	5	1 or 2	1 (2)	3
Quantity of digital event inputs	4	2	1	4	4	6
Quantity of analogue event inputs	1 (+ supply voltage)	1 (+ supply voltage)	-	supply voltage	1 (+ supply voltage)	3 (+ supply voltage)
Quantity of readable analogue data	2	2	-	1	2	4
Quantity of temperature event inputs	0	2	1	-		2
Quantity of readable temperature data	0	2	1	-		2
Events cell phone numbers	4	4	4		6	7

Hardware

The BR900-ST module consists of the microprocessor, voltage regulator, inputs driver, MOSFET output transistors, built-in GSM module, push-push SIM-card holder, GSM antenna connector, pluggable 10-ways screw terminal for external power supply and input and output signal connection.
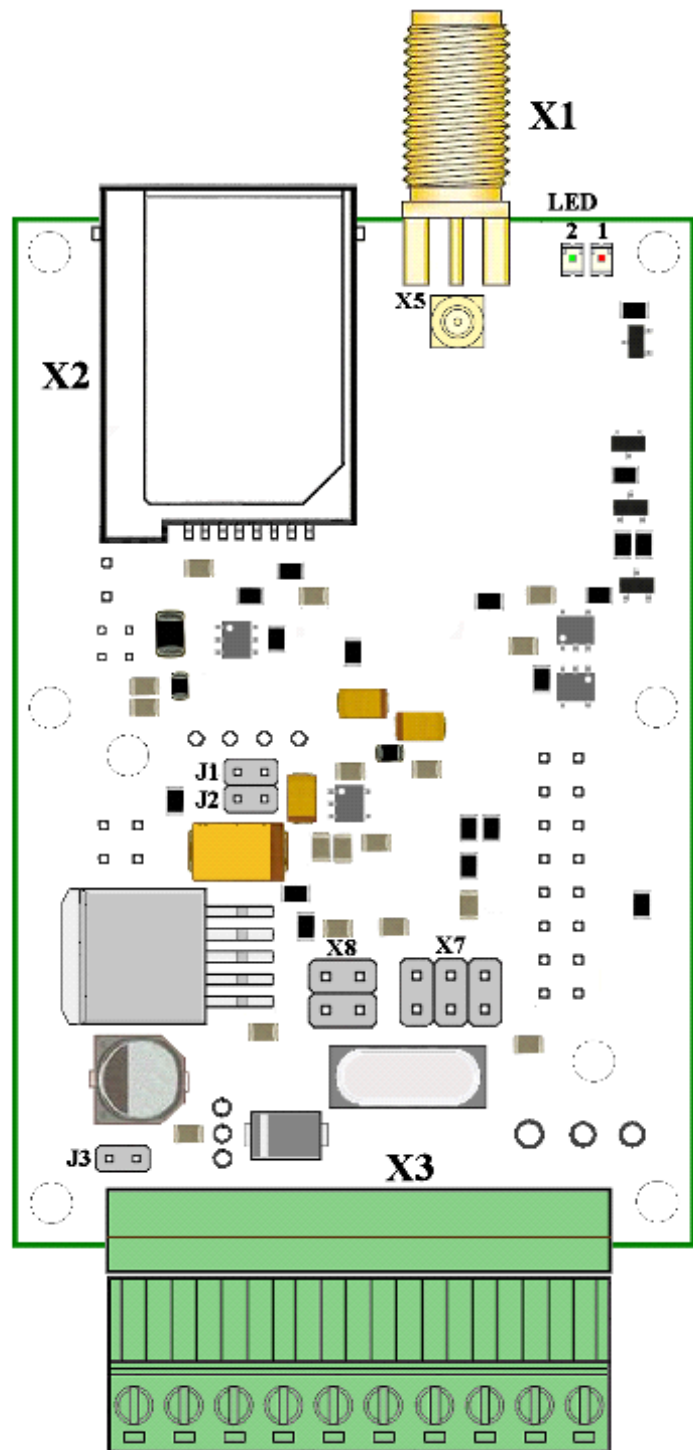
GSM module BR900-ST
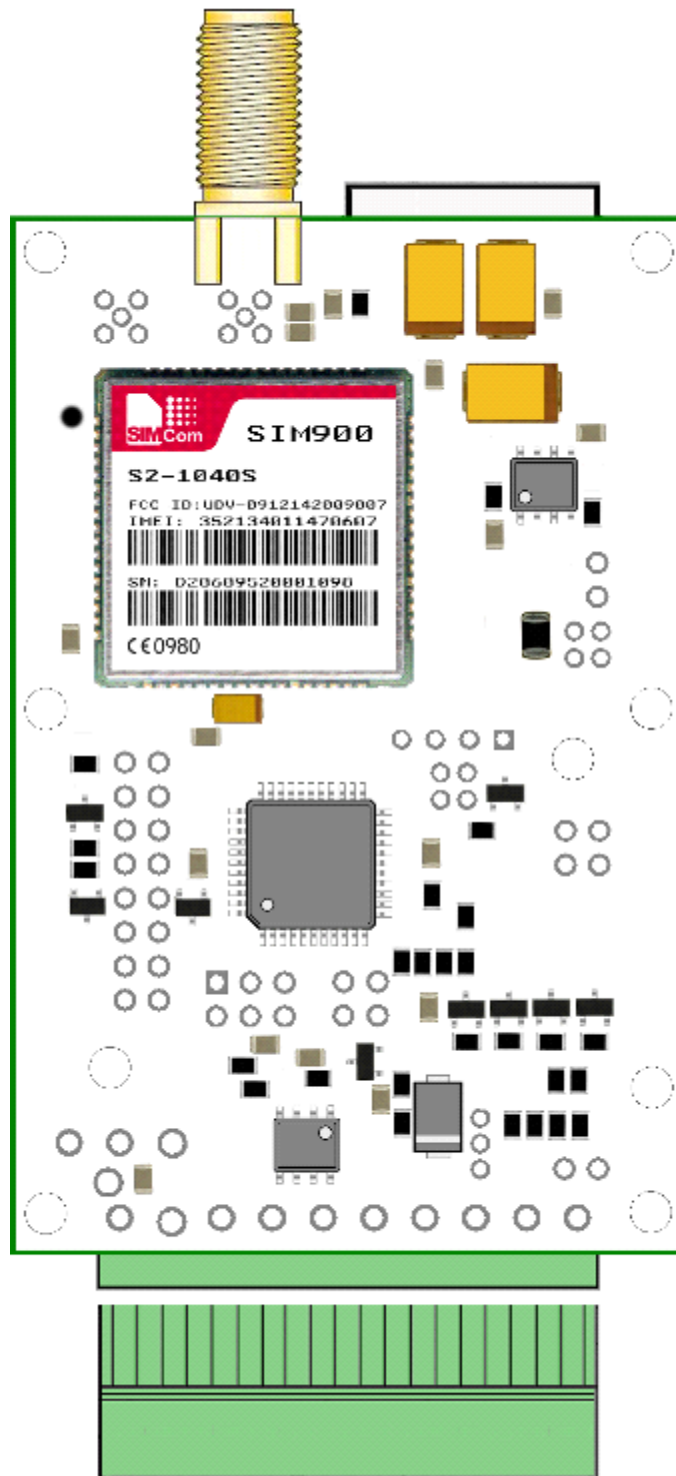
GSM module BR900-ST

Power Supply

The BR900-ST operates from a stabilized power source. It draws less then 50mA standby, less then 300mA rms and 2A peak typ. (3A peak max.). +12VDC/1.2A min switching stabilized power supply is recommended. Power supply input has reverse polarity and over-voltage protection. The BR900-ST can operates also from 6VDC to up to 14.5VDC stabilized power supply.

SIM Card

Small SIM-card with 3V/1.8V technology

Preparation of SIM card

1. Delete any SMS messages from SIM.
2. **Disable PIN code** request so it will not prompt for a PIN code on turning on.
3. First SMS to module **- 2345N1** from your cell phone (store your number)

Note:
- *The BR900 can only be used with small SIM-cards with 3V/1.8V.technology.*
- *For SIM card preparation you can use cell phone or external GSM modem.*
- *SIM card change if power turn off.*

LED indicators

- Module status indication - RED LED (LED1)
- GSM module SIM900 status indication - GREEN LED (LED2)

Module LED indication (Red LED)

LED status	Modem status
Permanently off	Device off
Short blinking after power on	SIM card read process
Short periodic blinking	Module in work
Permanently on	Module work with modem

GSM Module SIM900 LED GSM status indication (Green LED)

LED status	Modem status
Off	GSM module SIM900 is not running
64ms On / 800ms Off	GSM module does not find the network
64ms On / 3000ms Off	GSM module find the network
64ms On / 300ms Off	GPRS communication

Connectors and Jumpers

The BR900-ST consist 10-way pluggable screw terminal for power supply, inputs and outputs connection, push-push SIM connector for SIM card, SMA (female) connector for GSM antenna connection and optional MMCX (female) connector for MMCX(male)-SMA(female) cable for GSM antenna connection. Optionally BR900 have also 2x8 pin header (X4) and 2x2 pin header (X11) for additional extended adapter board connection.
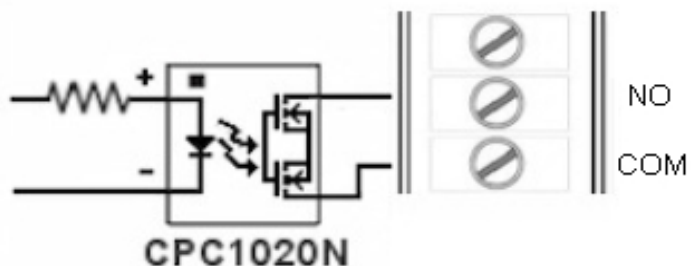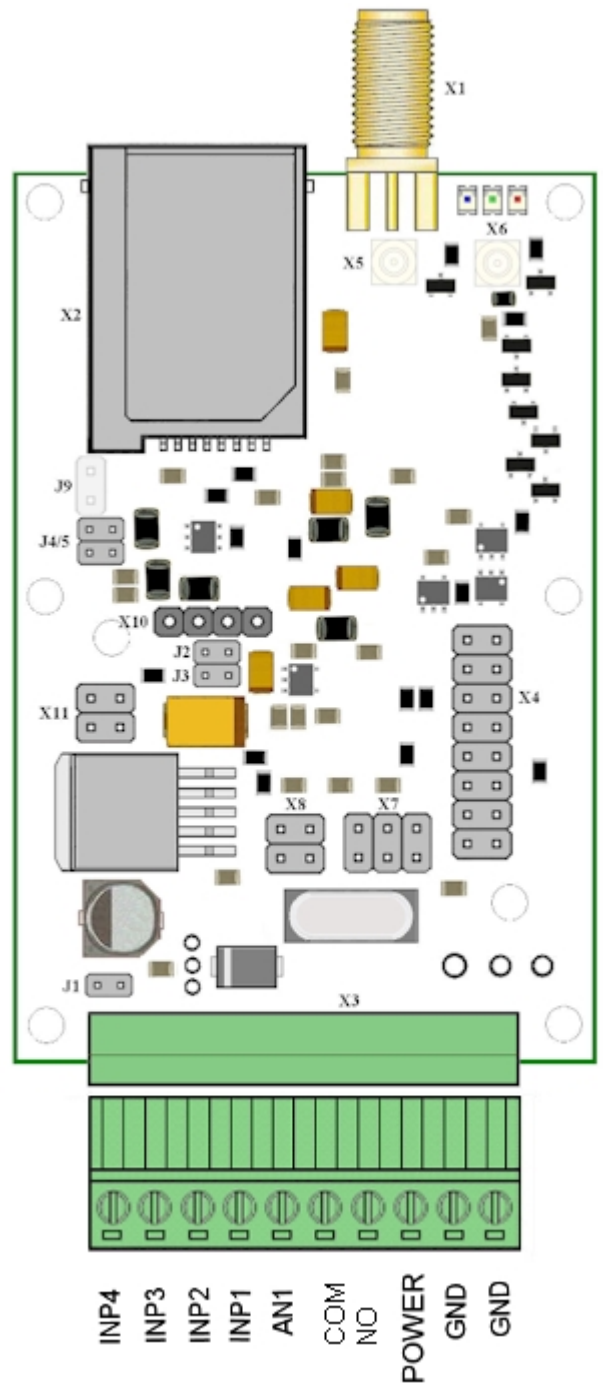
X1 – GSM antenna SMA (female) connector
X2 – Push-push SIM connector
X3 – Pluggable 10-ways terminal block for power supply and external inputs/outputs signal connection
X4, X11 – Pin headers for optional extension adapter board connection
X5 – optional MMCX (female) connector for MMCX to SMA bulkhead GSM antenna cable for any other enclosure
X7 – ISP interface connector for Firmware programming
X8 – control point
J1/J2 – Jumpers for firmware mode setting
J3 – Jumper for connection INPUT4 to GND.

Power Supply:	see "Power supply"
Digital Inputs:	NTR4003N MOSFET transistor 0-20V max)
Analogue Input:	0...15.5 max with resistive divider and diode protection
Digital outputs:	Solid State Relay outputs, 30V max / 1A max

OUTPUT

NO - COM – GATE OPEN pulse

SSR output:
SSR:	CPC1020
Max. Voltage:	30V

CPC1020N

Jumpers

Jumper J1   - not used

Jumper J2   - Set default password 2345:
　　　　　　　　　set jumper
　　　　　　　　　power ON
　　　　　　　　　after 5sec power OFF
　　　　　　　　　remove jumper

GSM antenna connector

GSM antenna must be connected to SMA female connector X1. Use only the 50Om antenna of the necessary frequency range. Base version completed with direct mount GSM antenna.
Optional X5 MMCX female connector used for connection MMCX(m) to SMA(f) cable for mounting to any other enclosure.

Note: It is very important that the antenna is installed on a location where the GSM-network coverage is sufficient. Please also check carefully that antennas are not installed nearby technical devices, cables etc. which could influence the GSM-radiation.

Inputs and Outputs connection

Digital inputs, analogue input, outputs and power supply must be connected with pluggable screw terminals blocks X3.

　　Digital inputs - 4
　　Analogue inputs – 1
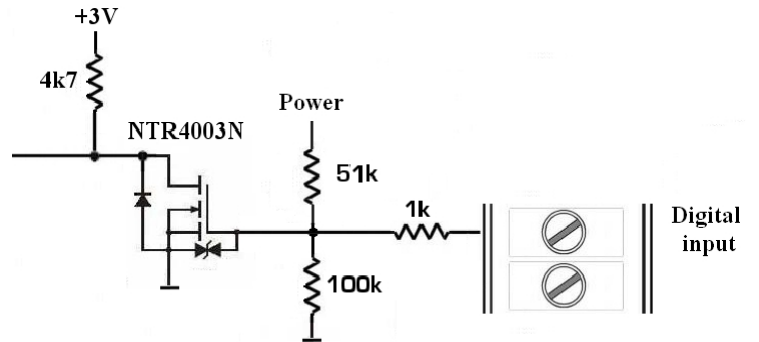　　Solid State Relay outputs - 1

See "Inputs and Outputs"

Inputs and Outputs

Inputs

Digital Transistor Inputs

Driver type: MOSFET transistor NTR4003
Connector: Pluggable screw terminal block
Inversion: Yes
Max input voltage: 20V
Free Input: logic "0"
Logic "0": 0V…+1V
Logic "1": +2V…+20V

Pull-up resistor: 51k – only for INPUT3 and INPUT4
INPUT1 and INPUT2 – without pull-up resistors
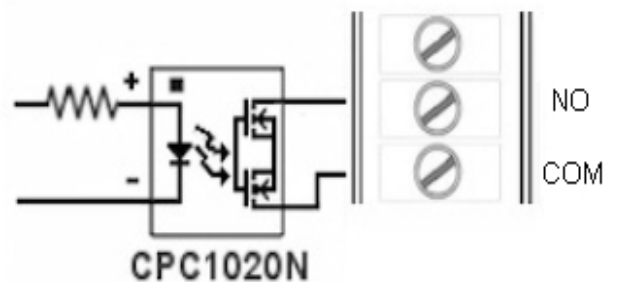
Analogue Inputs 1

Connector: Pluggable screw terminal block (for analog input1)
Input type: CMOS
Input Voltage: 0 to +10V: – ANALOG1
ADC resolution: 10-bit
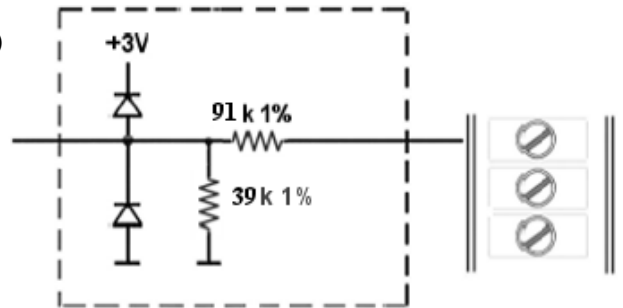
Outputs

Solid State Relay Outputs

Connector: Pluggable Screw terminal block
Solid State Relay: single-pole, normally open (1-Form-A)
Solid State Relay CPC1020N
Max. Voltage: 30V
Max. Current: 1A
On-resistance: 0.25om
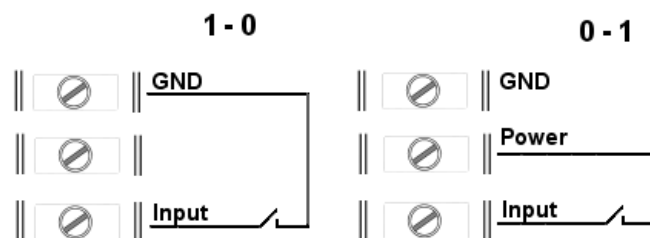
Connection Example

Connection example to Input Driver
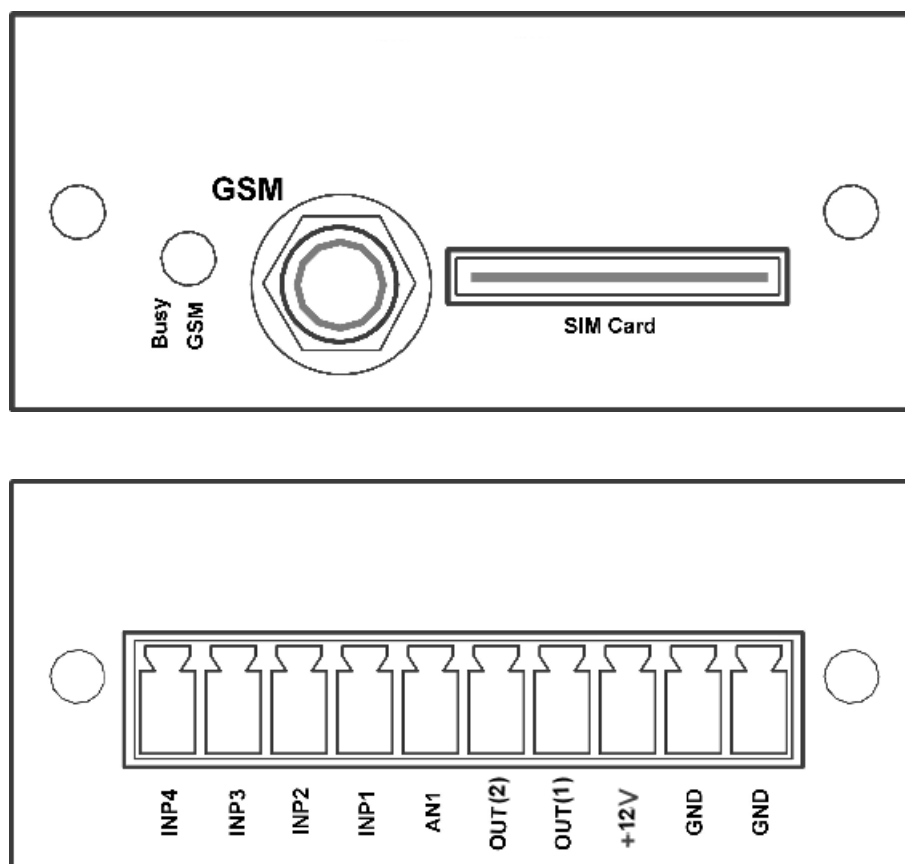
 1-0 and 0-1 event notification
You can use J2 pin header for in-board pull-up resistor connection.

Enclosure

For all BR900 version used Fischer Elektronik aluminium enclosure AKG 55 24 80 ME.

● BR900 Board dimensions: 50.5x77.5mm
● Enclosure AKG 55 24 80 ME dimension 54 x 80 x 24 mm

Programming

Digital signal monitoring

	Open input	Connection to GND	Connection to Power supply	Event all 0-1	Event all 1-0
Digital input 1	'0'	'0'	'1'	0-1	1-0
Digital input 2	'0'	'0'	'1'	0-1	1-0
Digital input 3	'1'	'0'	'1'	0-1	1-0
Digital input 4	'1'	'0'	'1'	0-1	1-0

Event 0-1 or 1-0 selected with SMS command 2345V0 and 2345V1

Analogue signal monitoring

Analogue input and supply voltage monitoring (default setting)

	Analogue input 1	Analogue 2 (internal) = Supply Voltage
Minimum set-point	00%	70%
Maximum set-point	00%	00% (set-point disable)
+5V	32.26%	32.26%
+10V	64.52%	64.52%
+10.85V	70.00%	70.00%
+12V	77.42%	77.42%
+15,5V	100%	100%

Can set minimum and maximum setpoints in % (for Analogue 1 and Analogue 2).

Analogue signal (in %)

0%	MIN level	MAX level	100%
	< MIN	NORMAL	> MAX
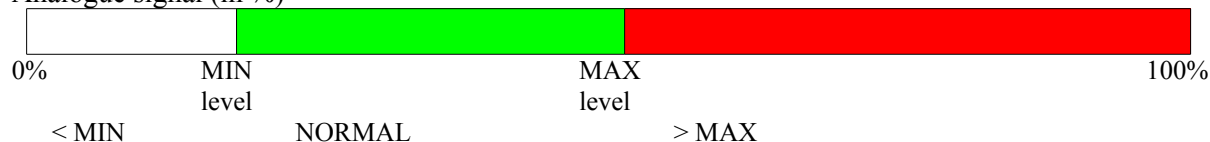
For supply voltage monitoring -

Alarm text SMS constantly:
Voltage low
Voltage normal
Voltage high

GATE OPEN function

after 2345E clear EEPROM

Nr.	EEPROM	SIM card Phone Book	
001			
002			
003			
...			
250			

After 2345a,+37129106159

Nr.	EEPROM	SIM card Phone Book	
001	+37129106159	+37129106159	
002			
003			
...			
250			

After 2345a,+37122842913

Nr.	EEPROM	SIM card Phone Book	
001	+37129106159	+37129106159	
002	+37122842913	+37122842913	
003			
...			
250			

After 2345a,+37122842914

Nr.	EEPROM	SIM card Phone Book	
001	+37129106159	+37129106159	
002	+37122842913	+37122842913	
003	+37122842914	+37122842914	
...			
250			

After 2345d,+37122842913

Nr.	EEPROM	SIM card Phone Book	
001	+37129106159	+37129106159	
002			
003	+37122842914	+37122842914	
...			
250			

2345y - from SIM card to EEPROM

NOTE:

For difference mobile operators can be difference number format in CLIP.

For example for Latvia
+37122842915 or
22842915   (without country code)
You can write with country code and without country code

Also for difference country can be difference number format in CLIP

for UK:
At position 001 and 002 you should write number with country code (+441234567890)
At position 003 ... 250 you should write number without country code (01234567890)

SMS command

	Digital and Analogue signal monitoring
SMS command	**Text** (length 15 characters)
	Default text
2345X0,text	Input event 1
2345X1,text	Input event 2
2345X2,text	Input event 3
2345X3,text	Input event 4
2345X4,text	Analogue high
2345X5,text	Analogue low
2345X6,text	Analogue normal
	BATTERY high
	BATTERY low
	BATTERY normal

Note – If first character in text space, then disable alarm SMS for this event

SMS command	Answer SMS	Function
GATE OPEN CONTROL | ADD / DELETE NUMBER for GATE OPEN		
2345A,+37122842913	NR. 5:+37122842913 added NR. 4:+37122842913 exist	Add number (add subscriber)
2345D,+37122842914	NR. 3:+37122842914 deleted NR +37122842914 not exist	Delete number (delete subscriber)
2345G,050	NR 50:+37122842914	Get Number at position 050 Maximum numbers up to 250
2345M2	I1=0 I2=0 I3=0 I4=0 I5=0 I6=0 O1 OFF, O2 OFF, O3 OFF, O4 OFF Pulse(sec):2 MaxNN=60	Set maximum numbers MaxNN = N* 30 1: 30, 2: 60 … 8: 240, 9: 250
2345B10 2345B00 2345B01	I1=0 I2=0 I3=0 I4=0 I5=0 I6=0 O1 OFF, O2 OFF, O3 OFF, O4 OFF Pulse(sec):2 MaxNN=30	00 - Enable Gate Open Pulse (default) 10 – Disable (Blocking) Gate Open Pulse 01 – All numbers enable for Gate Open
2345E	OK	Clear EEPROM for numbers
2345Y	copy from SIM to EEPROM done	Copy numbers from SIM to EEPROM
NUMBERS and TEXT FOR ALARM SMS (DIGITAL INPUTS)		
2345N1,+37122842914 ... 2345N4,+37122842913		Set number at position 1..4 for alarm SMS Note: after add new number for alarm SMS please check with event number to make sure that the number is recorded properly
2345U1 … 2345U4	OK	Set own number at pos.1..4 for alarm SMS
2345C1 … 2345C4	OK	Clear number at pos.1..4 for alarm SMS
2345X1,Input 1 ... 2345X4,Input 4	1:Input 1	Set text message for inputs 1...6 text up to 18 characters

GSM module BR900-ST

PASSWORD - Default password 1 - 2345, Default password 2 - 6789		
2345P2010	Psw1: 2010	Set new password 1; new password 2010 **with password 1**
6789Q1234	Psw2: 1234	Set new password 2; new password 1234 **with password 2**
OUTPUTS CONTROL		
6789S1	INFO SMS	Set output, **with password 2**
6789R1	INFO SMS	Reset output, **with password 2**
2345T1 … 2345T9 2345T0	INFO SMS	Set pulse length; 0- latch mode 1 - 1 sec … 9 – 9 sec **default 2 sec**
2345I	INFO SMS I1=0 I2=0 I3=0 I4=0 O1 OFF, O2 OFF Pulse(sec):2 MaxNN=30 B=12.0V	Get INFO, **with Passw.1** Inputs state Output state Pulse length (sec), Max.Numbers Supply voltage
2345Z	OK	Restart
ALARM VOLTAGE LEVEL		
2345L,0090	Vbat Min:90 Max:150	Set low level setpoint for supply voltage monitoring
2345H,0145	Vbat Min:90 Max:145	Set high level setpoint for supply voltage monitoring

SMS command
with password 1 – for all SMS command, except 'S', 'R', 'Q'
with password 2 – for SMS command 'S', 'R', 'Q'
command 'I' with passw.1 or passw.2

Info SMS

I1=0 I2=0 I3=1 I4=1	outputs state
O1=OFF O2=OFF	input status
Pulse(sec)=2	gate open pulse
MaxNN=250	maximum numbers
B=12.1V	supply voltage

Password

Default password 2345

   If you forgot password, you can restore default password with jumper J2
   Power OFF
   Set jumper (red)
   Power ON
   wait 5 sec
   Power OFF
   remove jumper (red)