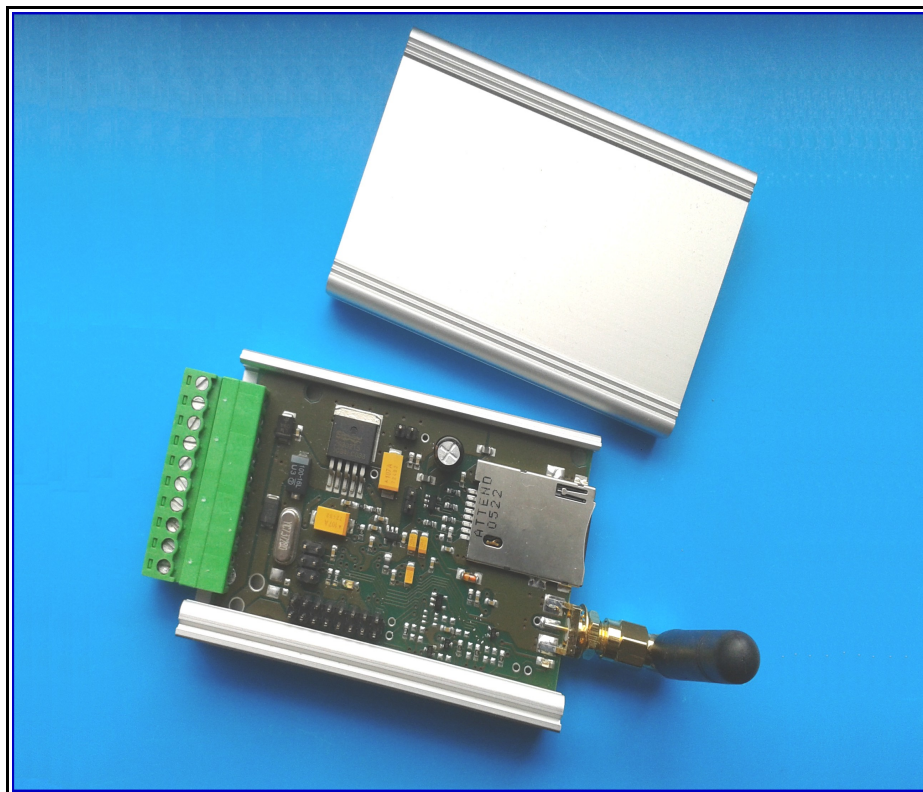Biene Electronics
www.bieneelectronics.com

GSM controller module
for SMS remote monitoring, alarming and control applications
with
extension board
for extra function according to customer requirements

BR900-XX-3G
BR900-XX-2G

06.oct.2020

Preliminary version

www.bieneelectronics.com

Introduction

The BR900-XX controller is a low dimensions low cost GSM communications device that used for wireless alarming, monitoring, measuring and control of signals from equipments.
The built-in SIMcom GSM module SIM800 compatible with 2G Quad-band (850/900/1800/1900Mhz) GSM/GPRS networks (BR900-XX-2G).
The built-in SIMcom GSM module SIM5300 compatible with Dual-band (900/1800Mhz) GSM/GPRS networks and 3G Dual-Band UMTS/HSPA 900/2100MHz (BR900-XX-3G).
You can use a mobile phone to - monitor the status of equipment or system, receive notification of events, send control commands to remote equipment, receive information of controlled object to your mobile phone.

Features

- GSM module SIM5300 for 3G (Dual-Band UMTS/HSPA 900/2100MHz) and 2G (Dual-Band GSM/GPRS/EDGE 900/1800MHz) version
- GSM module SIM800 for 2G (Quad-Band GSM/GPRS 850/900/1800/1900MHz) version
- Base board:
  - 4 digital inputs
  - 1 analogue input
  - 2 Open-Drain Mosfet Outputs 1 Solid State Relay outputs
  - optionally 1 Solid State Relay output instead of Open-Drain Mosfet Outputs
- 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 +5...12VDC (14.5V max)
- Optionally extended board
  - up to 6 inputs/outputs lines for control and measuring any signals
- Board dimensions: 50.5x77.5mm
- Enclosure (optional): FISCHER ELEKTRONIK AKG 55 32 80 ME with extension board

Applications:

- Pumping
- Transformer Station
- Base Stations
- Power Generator
- Refrigerator
- Waster-water Treatment Station
- Unmanned Equipment and System

BR900 Versions

BR900-ST - Standard version
BR900-SMT - Temperature alarming and monitoring version for Smartec temperature sensors
BR900-PT100 - Temperature alarming and monitoring version for Pt100 temperature sensors
BR900-RF - RF-control version for wireless remote control switch AC power plugs
BR900-GATE - Gate opener version for Gate control
BR900-GPS - GPS version for position tracking
BR928-DL - Data logger version with extended inputs and outputs and with GPRS data transfer to WEB server
BR900-XX - module for development extra function with customer requirements

SMS Function

SMS controller send an event SMS messages to up to 3 cell phones. Any cell phone can be used to send SMS commands to BR900. Mobile users can contact and request information from a BR900 controller and up to 4 users can receive notification of events.

With the BR900 you can use a mobile phone to:

- Monitor the status of equipment or systems
- Send control commands to remote equipment
- Receive notification of events to your mobile phone or WEB server (data logger version)

Any BieneRemote controller can be used to send SMS commands to other BieneRemote GSM controller for remote control.
Any BR900 controller can be programmed via SMS instruction.

Input Signal Monitoring

Digital Signal Monitoring, Analogue Signal Monitoring, Temperature Monitoring, Humidity Monitoring, Pressure Monitoring, Other Signal Monitoring

Output Control

The BR900-XX has 2 (30V/0.5A max) Open-drain Mosfet outputs.
Optionally 1 Solid State relay outputs (30V/0.5A max) instead of Open-drain Mosfet outputs.
These may be controlled with SMS messages from approved users. To set any output as you like, you need only to send an SMS message.

Module to Module Control

The BR900 supports Module-to-Module management with SMS command.

Alarm

SMS messages can be sent to users when an input reaches an alarm state.

Module Programming/Configuration

The BR900 can be configured (programming) remotely with SMS command.
Configuration options include Alarm Message Content, Users and Administrators Phone Numbers and other.

Technical Specification

BR900 series Hardware Specification

	BR900-ST	BR900-SMT	BR900-RF	BR900-GATE	BR900-GPS	BR928-DL
GSM band support	**-3G** 3G Dual-Band UMTS/HSPA 900/2100MHz and 2G Dual-Band GSM/GPRS/EDGE 900/1800MHz **-2G** 2G Quad-Band GSM/GPRS 850/900/1800/1900MHz					
Internal GSM module	SIM5300 or SIM900					
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 or 1-0	0-1 and 1-0	0-1 and 1-0
- Digital signal filter	Yes					
Temperature sensor inputs						
Temperature sensor	-	SMT172	-	-		SMT172
Temperature inputs	-	2	-	-	1 optionally	2
Temperature input events	-	min/norm/max	-	-		min/norm/max
Temperature range	-	-45 to +99°C	-	-		-45 to +99°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 (option)	0-5V/0-10V 0-20mA (option)	-	-	0-5V/0-10V 0-20mA (option)	0-5V/0-10V 0-20mA (option)
- Analogue input events	min/norm/max	min/norm/max	-	-	min/norm/max	min/norm/max
Outputs						
- MOSFET Open Drain outputs	2 (20V/30V)	2 (20V/30V)	-	2 (20V/30V)	2 (20V/30V)	2 (20V)
- Solid State Relay outputs	1 (optional) (30V/1A max) instead of MOSFET outputs	1 (optional) (30V/1A max) instead of MOSFET outputs	-	1 (optional) (30V/1A max) instead of MOSFET outputs	1 (optional) (30V/1A max) instead of MOSFET outputs	-
- Relay Output	-	-	-	-	-	1 (125Vac/24Vdc/0.5 A
- 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	-	-	-

GSM module BieneRemote900

	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 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	+5..12Vdc (14.5Vdc max) stabilised	+5Vdc stabilised	+5Vdc stabilised	+5..12Vdc (14.5Vdc max) stabilised	+5..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	1A	1A	1A	1A	1A	1.2A
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 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	2 (1)	2 (1)	5	1	2 (1)	3
Quantity of digital event inputs	4	2	1	4	4	6
Quantity of analogue event inputs	1 (+power supply voltage)	1 (+power supply voltage)	-	power supply voltage	1 (+power supply voltage)	3 (+power 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-XX module consists of the microprocessor, voltage regulator, inputs drivers, Solid State Relay, built-in GSM module, push-push SIM-card holder, GSM antenna connector, pluggable 10-ways screw terminal for external power supply and input, output signal connection, pin headers (X4, X11) for extension board connections.
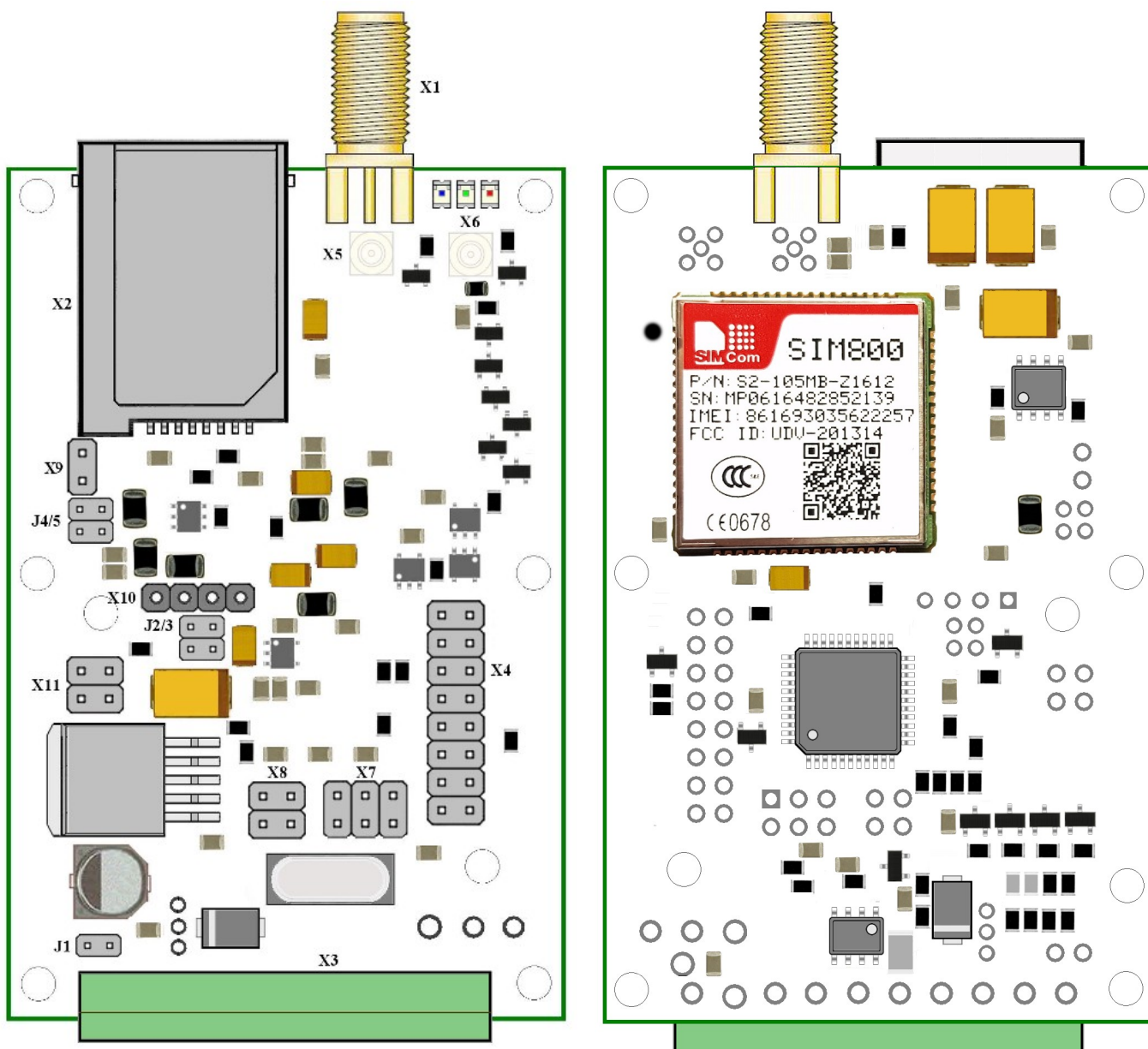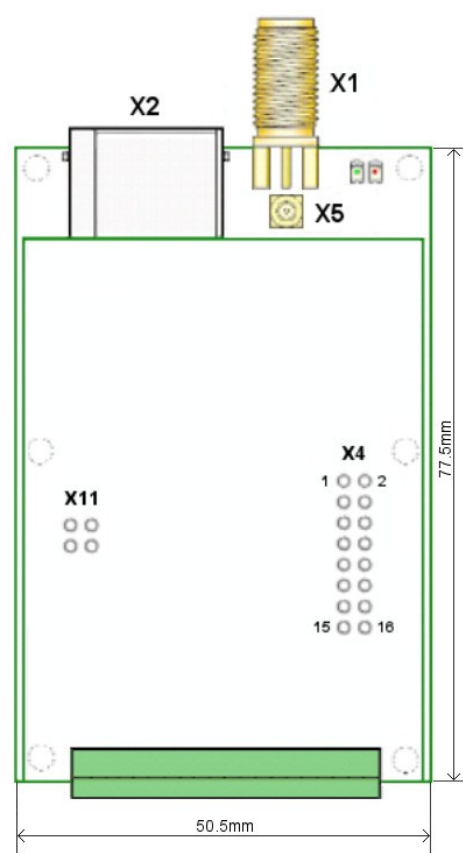
Extension Board

Extension Board for new customer function development connected to X4 and X11 pin headers.

X4

1	PA5 (microcontroller PA5 input/output)
2	PC1 (microcontroller PC1/SDA input/output)
3	GND
4	GND
5	VCC (3V)
6	VCC (3V)
7	PA2 (microcontroller PA2 input/output)
8	PC0 (microcontroller PC0/SCL input/output)
9	PA1 (microcontroller PA1 input/output)
10	PB0 (microcontroller PB0 input via transistor)
11	PB5 (microcontroller PB5 input/output)
12	RX (microcontroller PB1 output via transistor)
13	OUT1
14	GND
15	OUT2
16	POWER (+5...+14.5VDC)

X11

1	GND
2	GND
3	GND
4	GND

For developed new function can used 8 microcontroller inputs/outputs pins.
For extended inputs monitored signals connection on extension board can used pluggable 2-way, 3-way 4-way or 10-ways screw terminal.
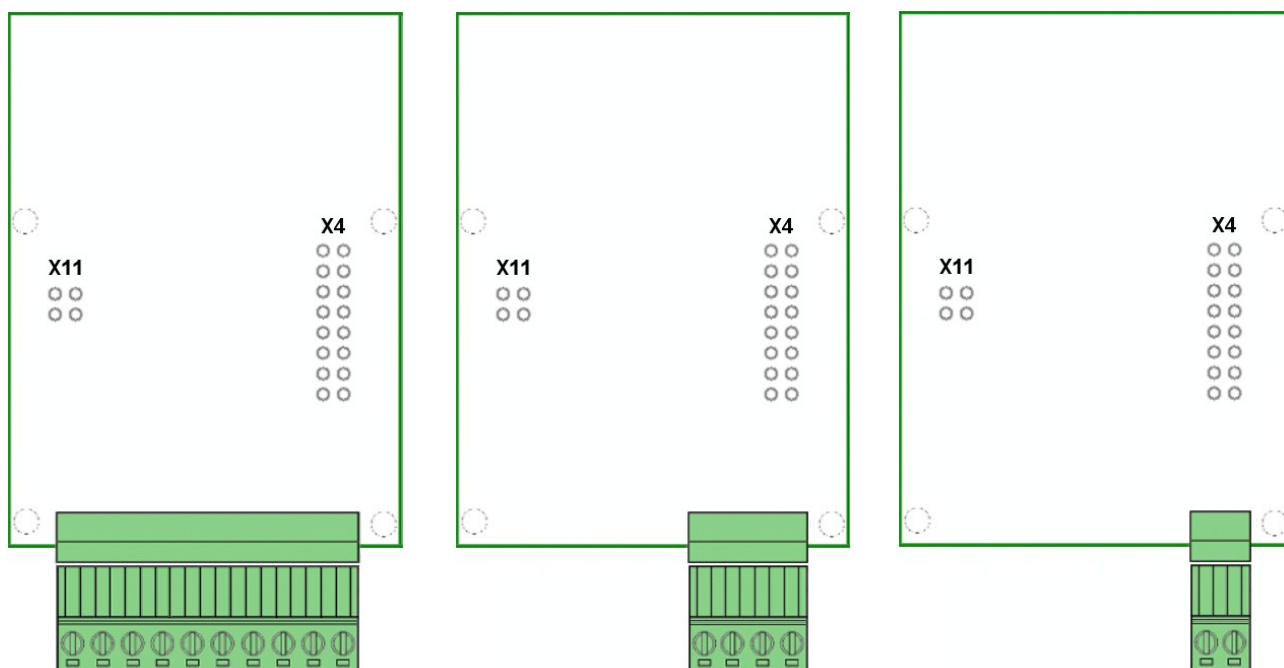
Power Supply

The BR900-XX 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-XX can operates also from +5VDC 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-XX 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. BR900-XX have also 2x8 pin header (X4) and 2x2 pin header (X11) for additional extended 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 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 – Serial Interface and Control points Connector
X9 – extended GSM modem power connector
X10 – extended connector for Telstic module
J1 – Jumper for connection INPUT4 to GND
J2/J3 – Jumpers for firmware mode setting
J4/J5 – Jumpers for TXD and RXT line from processor to GPS
controller connections

Power Supply:	see "Power supply"
Digital Inputs:	NTR4003N MOSFET transistor 0-20V max)
Analogue Input:	0...10V max with resistive divider and diode protection
Digital outputs:	MOSFET Open-Drain Outputs 20V/30V max / 1A max
	Optional: 1 Solid State Relay outputs, 30V max / 0.5A max
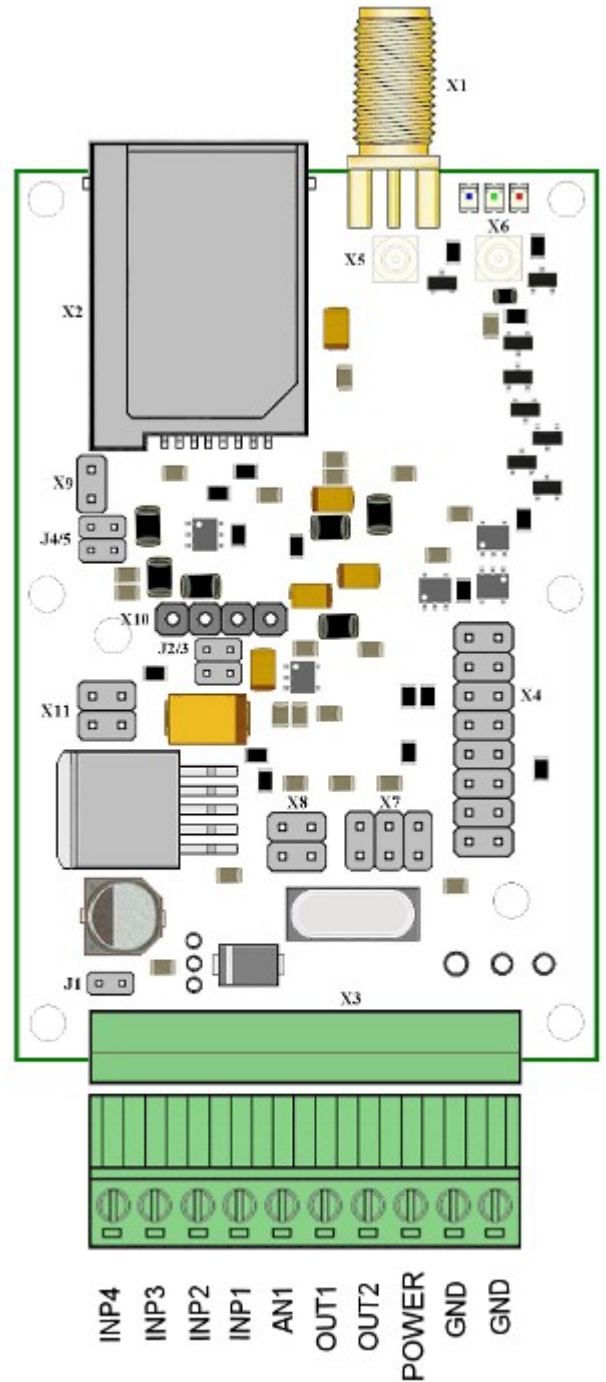
Jumpers

Jumper J1   - set input 4 to GND
Jumper J2   - not used
Jumper J3   - Set default password 2345:
                    set jumper
                    power ON
                    after 5sec power OFF
                    remove jumper
Jumper J4/5   - set in BR900-GPS version

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.

ISP interface

X7 – ISP interface connector for Firmware programming
X8 – Serial Interface and control points
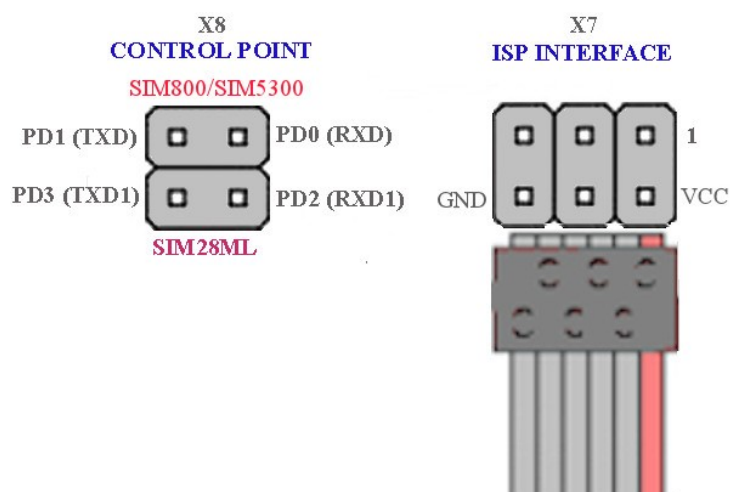
Inputs and Outputs connection

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

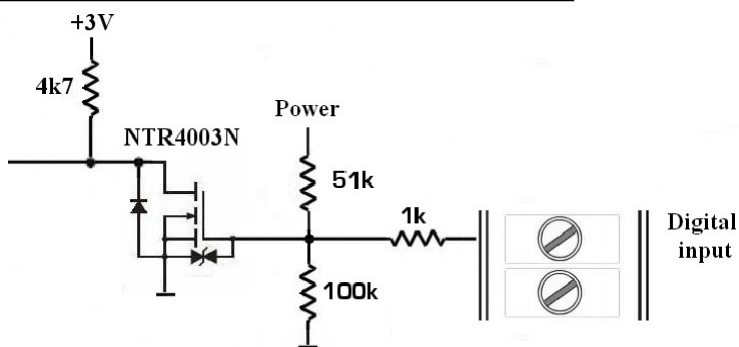*See "Inputs and Outputs"*

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
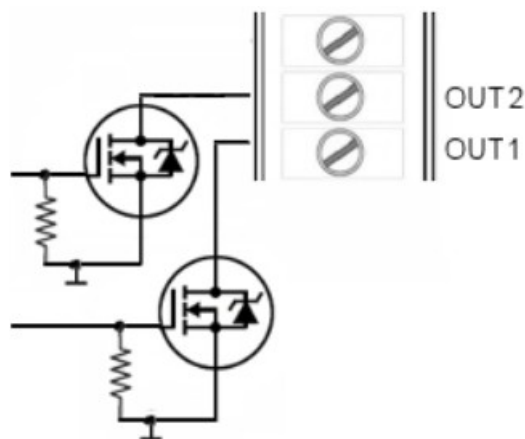
Analogue Inputs 1

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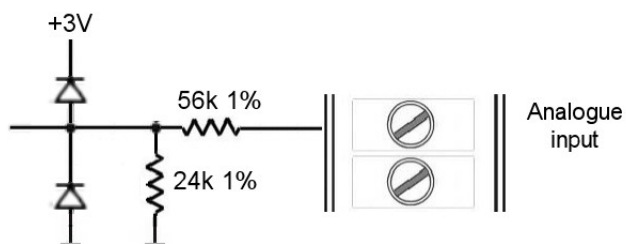
Outputs

MOSFET Open Drain Outputs

Connector: Pluggable Screw terminal block
MOSFET transistor: IRL6372PBF
Max. Voltage: 30V
Max. Current: 0.5A

Solid State Relay Outputs (optional)

Connector: Pluggable Screw terminal block
Solid State Relay: single-pole, normally open (1-Form-A)
Solid State Relay: CPC1020N
Max. Voltage: 30V
Max. Current: 0.5A
On-resistance: 0.25om
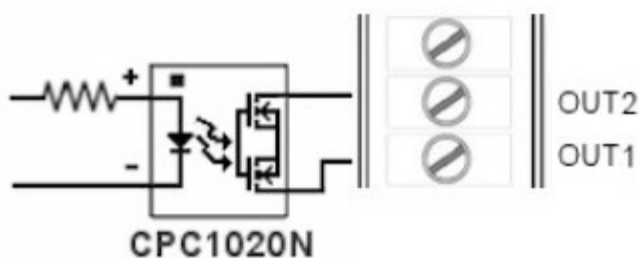
Enclosure

For all BR900-XX version can used Fischer Elektronik aluminium enclosure AKG 55 32 80 ME.

- BR900 Board dimensions: 50.5x77.5mm
- Extension Board
- Enclosure AKG 55 32 80 ME (dimension 54 x 80 x 32 mm) with extension board

BR900-XX