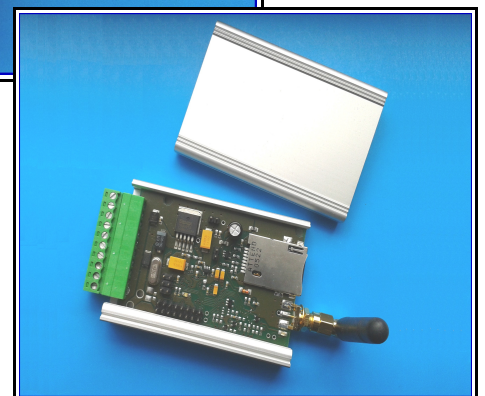
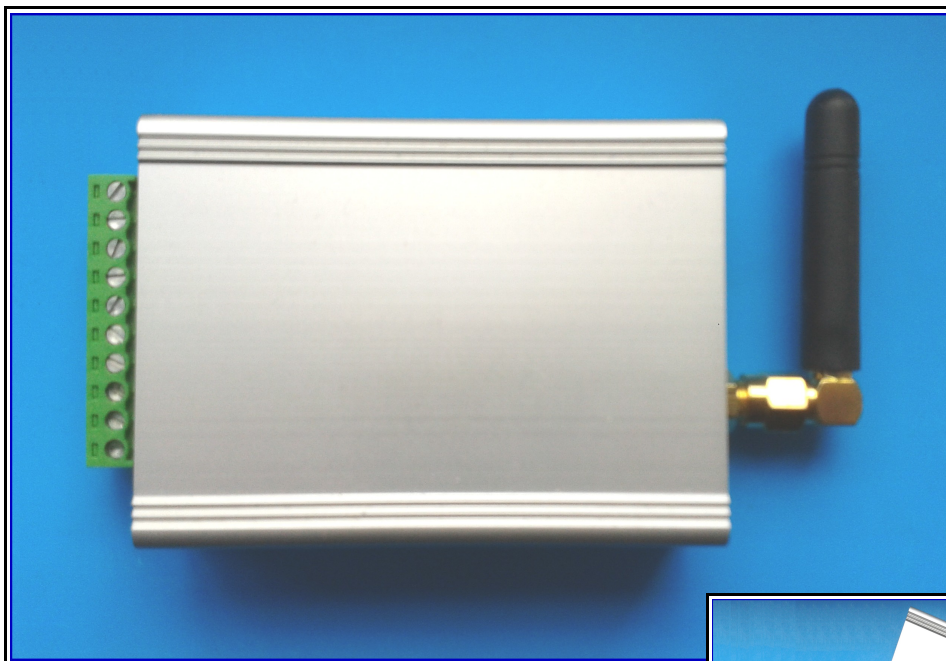


GSM controller module
for SMS remote temperature monitoring, alarming and control applications

BR900-SMT-3G
BR900-SMT-2G

Preliminary data

06.oct.2020



GSM module BR900-SMT

Introduction

The BR900-SMT controller is a low dimensions low cost GSM communications device that used for wireless temperature alarming and monitoring.

The BR900-SMT-3G controller with SIM5300 module for Dual-Band UMTS/HSPA 900/2100MHz and Dual-Band GSM/GPRS/EDGE 900/1800MHz.

The BR900-SMT-2G controller with SIM800 module for Quad-Band GSM/GPRS 850/900/1800/1900MHz networks.

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
- 2 digital inputs
- 2 temperature sensor SMT172 inputs
- 1 analogue input (0-5V / 0-10V; 4-20mA optionally)
- 2 Open-Drain MOSFET outputs (20V/30V/1A max; 30V)
Optionally 1 Solid State Relay outputs (30V/1A max) - instead of 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 stabilized +5VDC power supply
- Board dimensions: 50.5x77.5mm
- Enclosure: FISCHER ELEKTRONIK AKG 55 24 80 ME (optional)

Applications:

- Transformer Station
- Base Stations
- Refrigerator
- Waster-water Treatment Station

BR900 Versions

BR900-ST - Standard version

BR900-SMT - Temperature monitoring version

BR900-PT100 - Temperature monitoring version for Pt100 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

GSM module BR900-SMT

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 GSM controller.

With the BR900 GSM controller 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 GSM controller can be used to send SMS commands to other BieneRemote GSM controller for remote control.

Input Signal Monitoring

The BR900-SMT has 2 digital inputs that can be configured as:

- 0-1 or 1-0 event input
- two inputs connect with pullup resistor to module power supply

The BR900-SMT has 1 analog input.

- 0-5V / 0-10V Analog Input (4-20mA optionally)
- additional implemented on-board power supply voltage monitoring – 15.5V maximum

The BR900-SMT has 2 temperature sensors SMT160-30 (SmarteC) inputs.

- -45 to +99°C temperature range measurement and monitoring

Output Control

The BR900-ST has 2 - Open-Drain MOSFET Outputs (20V/30V/1A max).

Optionally - 1 Solid State Relay outputs (30V/1A max) instead 2 Open-Drain Mosfet Outputs.

These may be controlled with SMS messages from users. To set any output, 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:

Alarm when 0-1 or 1-0 event at digital inputs.

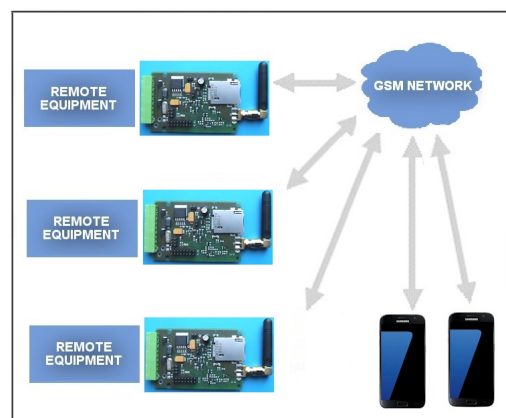
Alarm when above or below set point at analogue inputs.

Alarm when above or below set point at temperature sensors inputs.

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.



GSM module BR900-SMT

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	RF Transmit Power	Class 4 (2W) 850/900M hz, Class 1 (1W) 1800/1900 Mhz	RF Transmit Power	Class 4 (2W) 850/900Mhz, Class 1 (1W) 1800/1900Mhz	RF Transmit Power
Data transmission	SMS					SMS
SIM card reader	Push-push					
SIM card type	Phase 1 and phase 2+; SIM 3V / 1.8V					
Antenna Connection	50Ω SMA (f) Connector					
Digital inputs						Digital inputs
Digital inputs type	MOSFET transistor input (20V max)	Darlington transistor input	Digital inputs type	MOSFET transistor input (20V max)	Darlington transistor input	Digital inputs type
- 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					
- Digital signal filter	yes					
Temperature sensor inputs		Temperature sensor inputs		Temperature sensor inputs		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	-					
- Temperature filter		Yes				Yes
Analogue inputs		Analogue inputs		Analogue inputs		Analogue inputs
Analogue inputs	1	1	-	-	1	3
Analogue input range	0...10V	0...10V	-	-	0...10V	0-10V
Analogue input mode	-					
- 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		Outputs		Outputs		Outputs
- Relay Output	-	-	-	-	-	1 (125Vac/24Vdc/0.5 A
- Solid State Relay outputs	1 (optional) (30V/1A max)					
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 BR900-SMT

	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

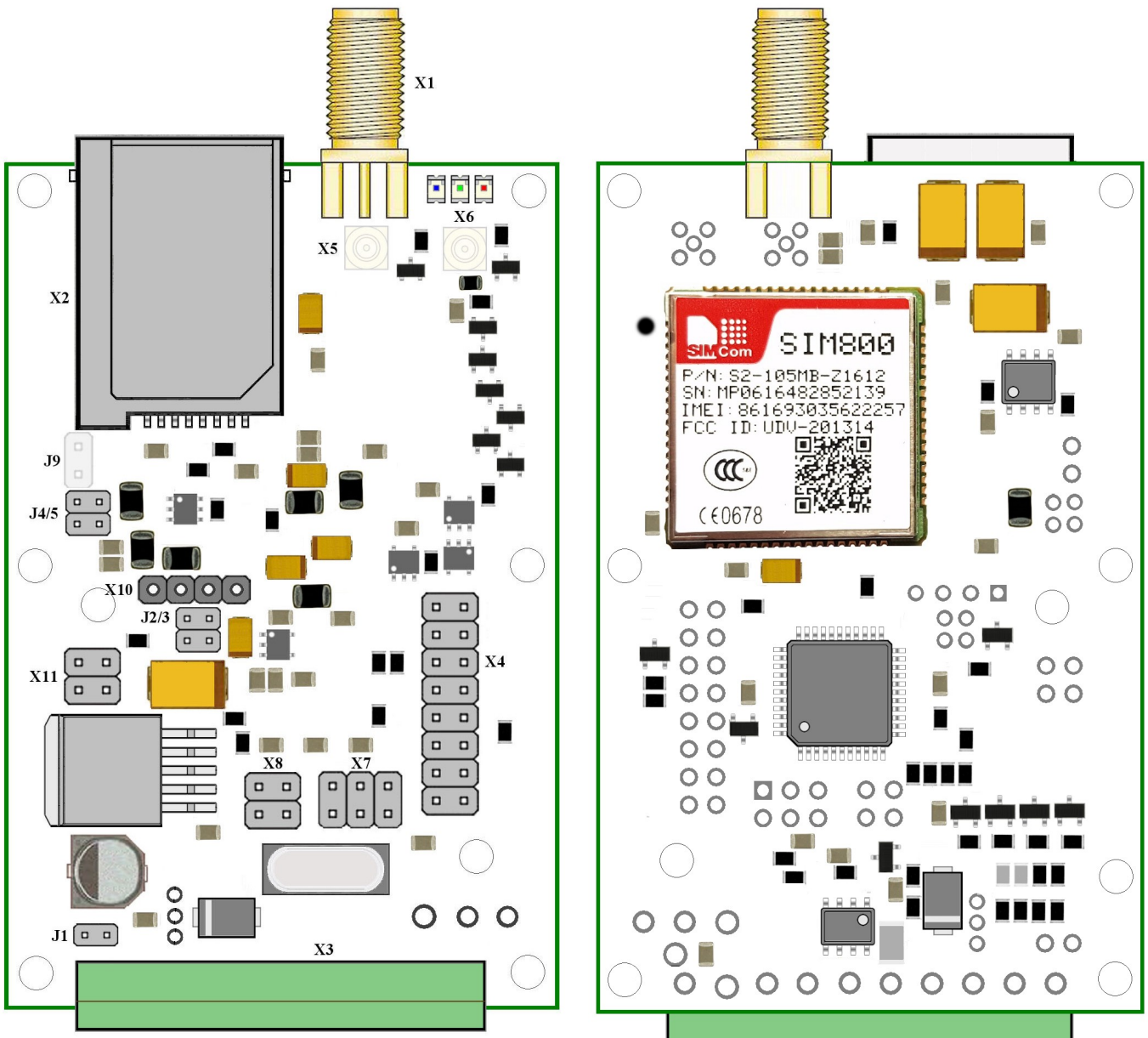
BR900 series Firmware Specification

	BR900-ST	BR900-SMT	BR900-RF	BR900-GATE	BR900-GPS	BR928-DL
Quantity of controlled outputs	1 (2)	1 (2)	5	1 (2)	1 (2)	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

GSM module BR900-SMT

Hardware

The BR900-ST module consists of the microprocessor, voltage regulator, inputs drivers, 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/output signal connection.



GSM module BR900-SMT

Power Supply

The BR900 operates from a stabilized +5VDC power source. It draws less than 50mA standby, less than 300mA rms and 2A peak typ. (3A peak max.). 5VDC and >1A switching stabilized power supply is needed for BR900-SMT version. Power supply input has reverse polarity and over-voltage protection.

Note:

- *The BR900-SMT used only +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 - **2345NI** 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 status indication - GREEN LED (LED2)

Module LED indication (Red LED)

LED status	Modem status
Permanently off	Device off
Short blinking after power on and after 1 min	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

GSM module BR900-SMT

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 input/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

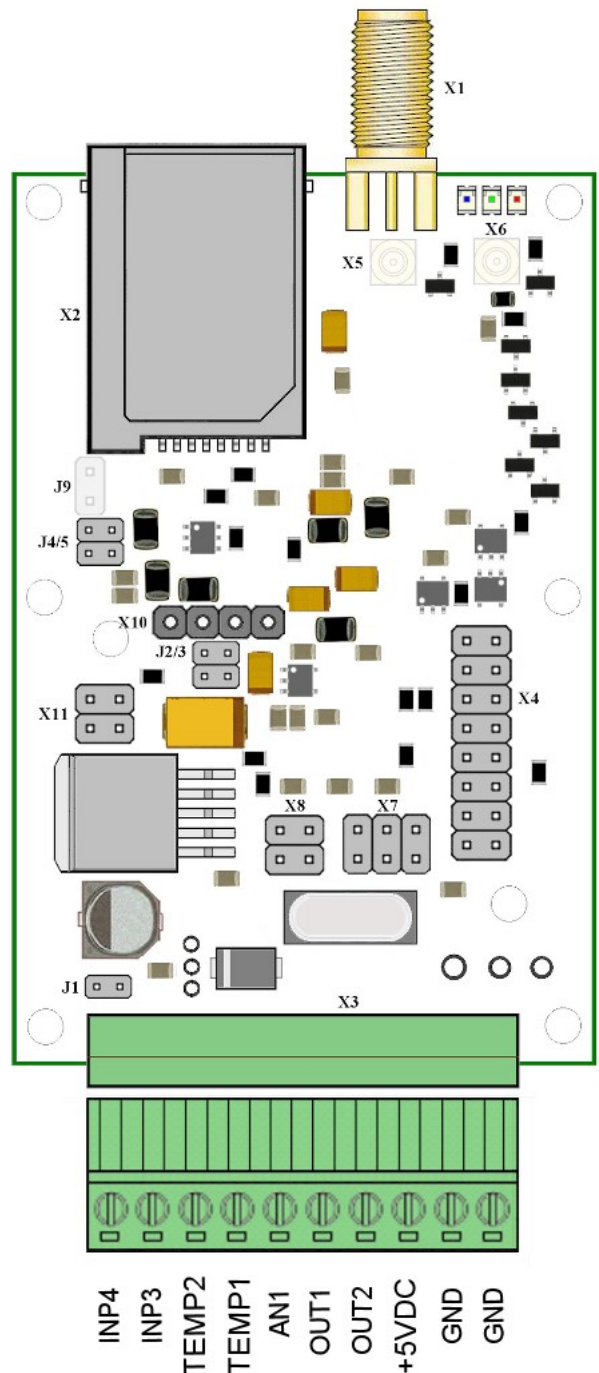
X7 – ISP interface connector for Firmware programming

X8 – control point

J1/J2 – Jumpers optional for firmware mode setting

J3 – Jumper for connection INPUT4 to GND.

Power Supply:	+5VDC external
Digital Inputs:	NTR4003N MOSFET transistor 0-20V max)
Analogue Input:	0...10 max with resistive divider and diode protection
Digital outputs:	Solid State Relay outputs, 30V max / 1A max



GSM module BR900-SMT

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 - not used

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 - 2

Analogue inputs – 1

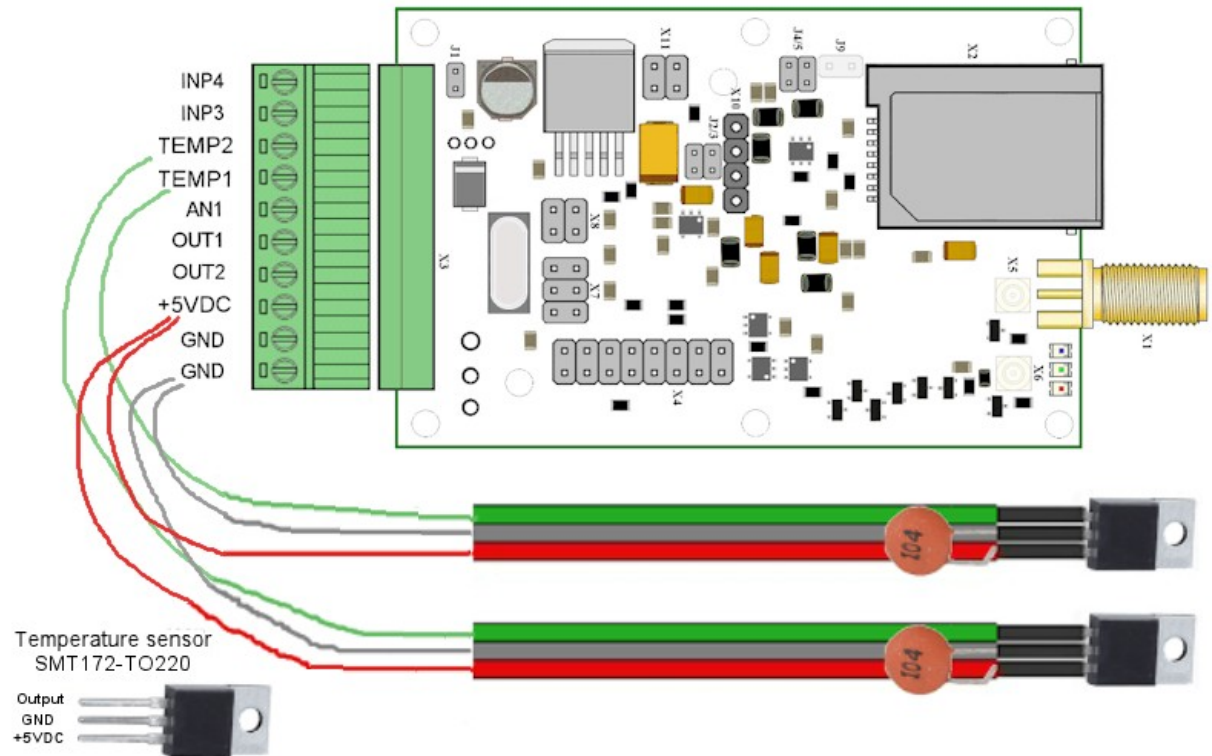
Temperature sensor SMT172 inputs – 2

MOSFET Open-Drain Outputs - 2 (optionally: Solid-State Relay output – 1)

See “Inputs and Outputs”

GSM module BR900-SMT

Temperature sensors Smartec SMT172 connections



Note:

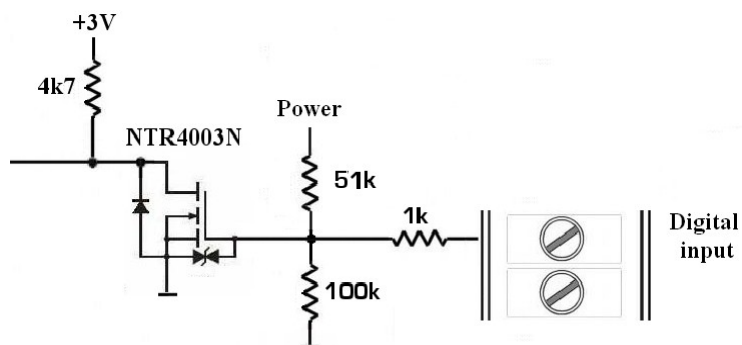
For cable need connect capacitor 100nF between GND and +5V sensor side. Also for long cable recommended used shielded cable.

Inputs and Outputs

Inputs

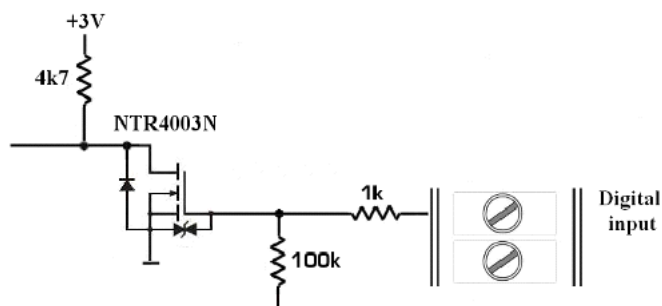
Digital Transistor Inputs (Inputs 3 and 4)

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 max



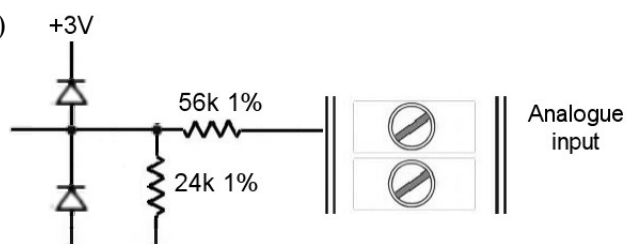
Temperature sensors SMT172 (Smartec) Inputs (Inputs 1 and 2)

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 max



Analogue Inputs 1

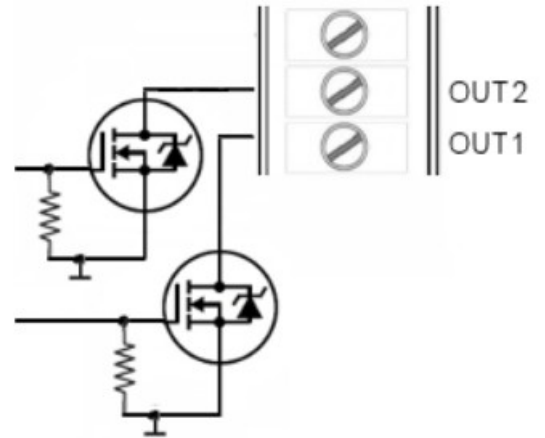
Connector: Pluggable screw terminal block (for analog input1)
 Input type: CMOS
 Input Voltage: 0 to +10V max



Outputs

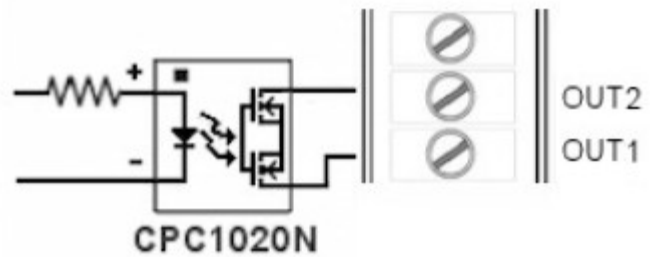
MOSFET Open Drain Outputs

Connector: Pluggable Screw terminal block
MOSFET transistor: IRF7301 / IRL6372PBF
Max. Voltage: 20V / 30V



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: 1A
On-resistance: 0.25ohm

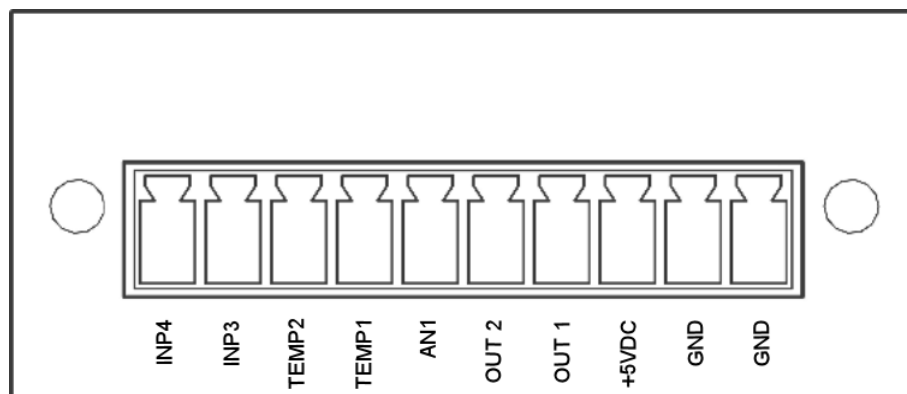
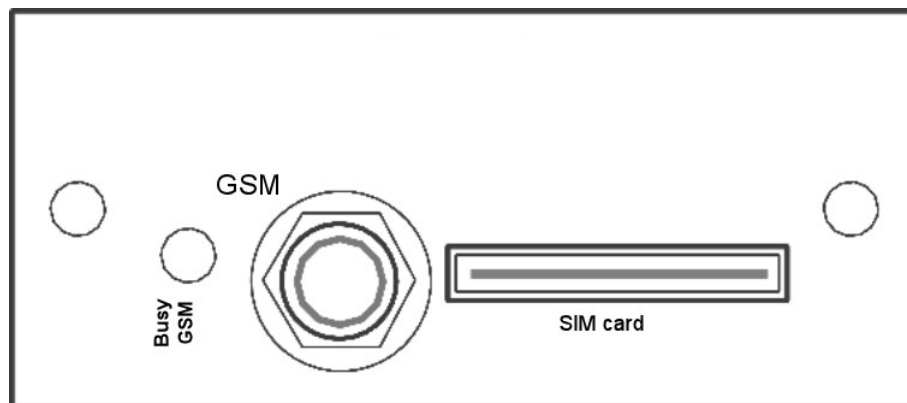


GSM module BR900-SMT

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	Event all 0-1	Event all 1-0
Digital input 1				
Digital input 2				
Digital input 3	'1'	'0'	0-1	1-0
Digital input 4	'1'	'0'	0-1	1-0

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

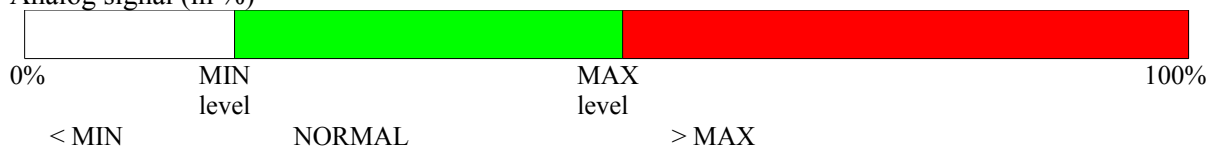
Analogue signal monitoring

Analogue input and supply voltage monitoring (default setting)

	Analogue input 1	Level for A1	Analogue 2 (internal) = Supply Voltage	Level for B
Minimum set-point	00%	000	4,5V	045
Maximum set-point	00%	000	5,5V	055
+2,5V	16.13%	161	2,5V	025
+5V	32.26%	322	+5V	050
+10V	64.52%	645	+10V	100
+10.85V	70.00%	700	+10.85V	108
+12V	77.42%	774	+12V	120
+15,5V	100%	999	+15,5V	155

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

Analog signal (in %)



For supple voltage monitoring -

Alarm text SMS constantly:

Voltage low

Voltage normal

Voltage high

Temperature monitoring

Compatible temperature sensors Smartec SMT160-30 or SMT172

http://www.smartec.nl/temperature_sensor.htm

(Vcc = +5VDC)

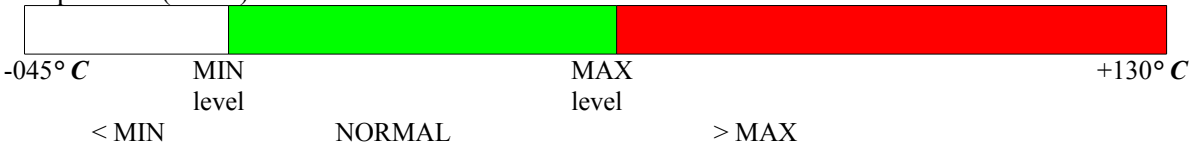
Temperature mode can set with SMS command 2345T1 (disable – 2345T0)

Output of temperature sensor SMT160-30 or SMT172 connected to digital input 1, GND to GND, Vcc to +5V.

Can set minimum and maximum setpoints. For Smartec SMT160-30 or SMT172 temperature range -45° C ... +130° C

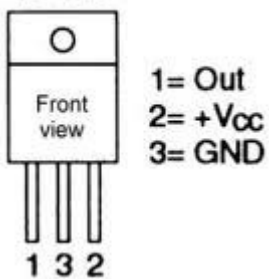
You can set setpoint in range from -45C to +99C

Temperature (in °C)

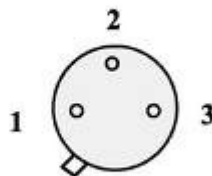


SMT160-30 or SMT172 temperature sensor
temperature range -45 ... +130C

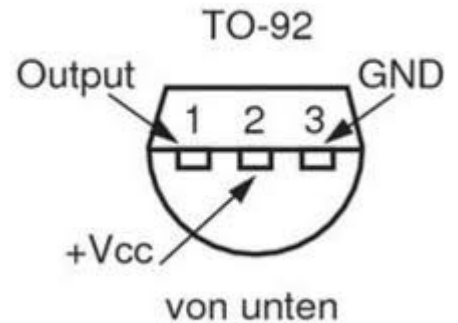
TO-220



pin 1 Output
pin 2 +Vcc
pin 3 GND



TO-18



Alarm SMS for temperature mode (example)

Temperature high

O1 OFF O2 OFF

I2=1 I3=1 I4=1

T=-10C A=0.0% U=34%

SMS command

Auto mode	Heater and air conditioner enable	Heater enable	Air conditioner enable	Both disable
SMS command	Text (length 16 char)	Text (length 16 char)	Text (length 16 char)	Text (length 16 char)
2345X01,	Temp.1 high	Temp.1 high	Temp.1 high	Temp.1 high
2345X02,	Temp.1 low	Temp.1 low	Temp.1 low	Temp.1 low
2345X03,	Temp.1 normal	Temp.1 normal	Temp.1 normal	Temp.1 normal
2345X04,	Temp.2 high	Temp.2 high	Temp.2 high	Temp.2 high
2345X05,	Temp.2 low	Temp.2 low	Temp.2 low	Temp.2 low
2345X06,	Temp.2 normal	Temp.2 normal	Temp.2 normal	Temp.2 normal
2345X07,	Input 3	Input 3	Input 3	Input 3
2345X08,	Input 4	Input 4	Input 4	Input 4
2345X09,	Analog 1 high	Analog 1 high	Analog 1 high	Analog 1 high
2345X10,	Analog 1 low	Analog 1 low	Analog 1 low	Analog 1 low
2345X11,	Analog 1 normal	Analog 1 normal	Analog 1 normal	Analog 1 normal
2345X12,	Battery high	Battery high	Battery high	Battery high
2345X13,	Battery low	Battery low	Battery low	Battery low
2345X14,	Battery normal	Battery normal	Battery normal	Battery normal

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

SMS command	Answer SMS	Function
2345L1+16 2345L2+18	(level info)	Set minimum temperature level in °C default: T1:+16, T2:+18
2345H1+27 2345H2+29		Set maximum temperature level in °C default: T1:+27, T2:+29
2345A0 2345A1 2345A2 2345A3 2345A4		0-Disable auto heater control, 1-Enable auto heater control, 2-Disable auto air condition control, 3-Enable auto air condition control, 4-Disable heater and air condition. control default: Disable auto heater and air condition control
2345F0	(level info)	Timeout filter for temperature 0: 30sec, 1: 5min ... 9: 45min; default 0
Enable alarm SMS / disable alarm SMS (for digital inputs only)	Enable alarm SMS / disable alarm SMS (for digital inputs only)	Enable alarm SMS / disable alarm SMS (for digital inputs only)
2345E	OK	Enable alarm SMS for digital inputs, default enable (after restart - enable)
2345B	OK	Disable alarm SMS for digital inputs

GSM module BR900-SMT

Get information	Get information	Get information
2345i	(information) T1=+22 T2=+23 I3=1 I4=1 O1 OFF, O2 OFF A1=0.0 B=5.0 AUTO: heater. D=15	Read information – temperature in °C input output analog Auto mode Out1 timer duration
Set/Reset Outputs; Timer Outputs; only for Output 1	Set/Reset Outputs; Timer Outputs; only for Output 1	Set/Reset Outputs; Timer Outputs; only for Output 1
2345S1 ... 2345S2	(information)	Set output **)
2345R1 ... 2345R2	(information)	Reset output **)
2345V30	(information)	set duration for timeout = 30 min (default 15 min)
2345T60 2345T	(information)	set Out1 for timeout = 60 min default timeout = 15 min set Out.1 for timeout = default ***)
2345Kn	OK	Internal control from digital inputs 3,4; internal control enable, then if event on digital input, start Out.1 ON on default time (see SMS command T) n = 0,1,2,3 0: disable; (table on next 17)
2345N1 ... 2345N4	OK	Set number for alarm SMS at position 1..4
2345C1 ... 2345C4	OK	Clear number at position 1..4 for alarm SMS
Alarm SMS text setting	Alarm SMS text setting	Alarm SMS text setting
2345X06, Input 06 2345X22	6: Input 06	Set text message for temperature 1 and 2 events, analog 1 ... 4 and for inputs 3..6. Text up to 14 characters (Text SMS message table on page 16) Clear text
Analog Inputs (AN1 – 0-10V, B(AN2)– external voltage 0-5V)	Analog Inputs (AN1 – 0-10V B(AN2) – external voltage 0-5V)	Analog Inputs
2345M1,350 2345M2,040	(level info)	Set setpoints for minimum analog level for A1 in %, B in V * 10 (table page 17) default: AN1 = 000%, B = 055 (5,5V)
2345Y1,650 2345Y2,060	(level info)	Set setpoints for maximum analog level for A1 in %, B in V (table page 17) default: AN1 = 000%, B = 055 (5.5V)

GSM module BR900-SMT

2345U	(level info) T1:+16+27 T2:+18+29 F:0 A1:00 00 B:40 55 0	Get setpoints temperature setpoints temperature timeout filter analog setpoints analog input mode
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Status info

T1=+22 T2=+19	temperature in °C
I3=1 I4=1	input status
O1=OFF O2=OFF	outputs state
A=00.0	analogue level
B=5.0V	supply voltage
D=15	

Password

Default password 2345

If you forgot password, you can restore default password with red jumper (J2)

Internal Control

Internal control for set Output 1 ON on duration time (= SMS command 2345T)
if event digital input 3,4 (SMS command 2345K)

SMS command	Digital Input	4	3	Internal control with Out.1 on default time
2345K0		0	0	disable
2345K1		0	1	Out.1 ON if event digital input 3
2345K2		1	0	Out.1 ON if event digital input 4
2345K3		1	1	Out.1 ON if event digital input 3 and 4