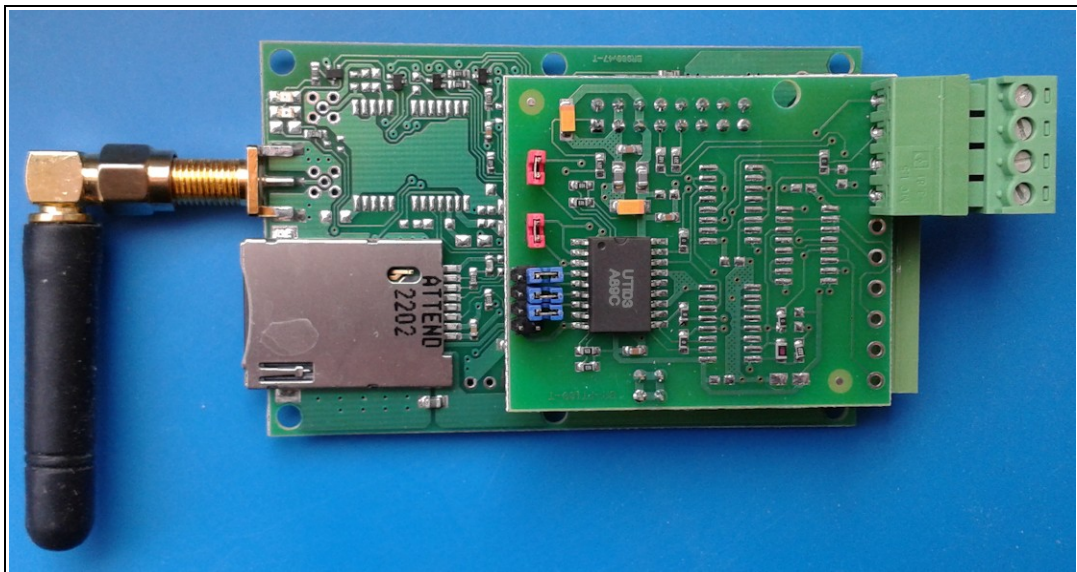


GSM module BR900 series

GSM controller module
for SMS remote temperature monitoring, alarming and control applications
BR900-PT100, BR900-PT1000

Preliminary version

30.may.2019



GSM module BR900 series

Introduction

The BR900-PT100 controller is a low dimensions low cost GSM communications device that used for wireless temperature alarming and monitoring. Multiple users can interrogate the BR900 notified on configurable events. The BR900-PT100 controller with SIM800 module for 2G Quad-Band GSM/GPRS 850/900/1800/1900MHz networks.

BR900-PT100 - Temperature measurement version for Pt-100 sensor
BR900-PT1000 - Temperature measurement version for Pt-1000 sensor (optionally)

Features

- GSM module SIM800 for 2G (Quad-Band GSM/GPRS 850/900/1800/1900MHz) version
- 1 (3 – optional) temperature sensor Pt100 (Pt1000 optional) inputs
- 4 digital inputs
- 2 Open-Drain MOSFET outputs (20V/30V/1A max; 30V)
Optionally 1 Solid State Relay outputs (30V/1A max) - instead of MOSFET outputs
- Remote programming using SMS
- User definable input alarming text descriptions
- Pluggable screw terminal block for external signal connections
- Push-Push SIM holder
- External stabilized +5...+12VDC (+14.5VDC max) power supply
- Board dimensions: 50.5x77.5mm
- Enclosure: FISCHER ELEKTRONIK AKG 55 32 80 ME (optional)

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 SMS/FTP tracking

BR928-DL - Data logger version with extended inputs and outputs

GSM module BR900 series

BR900 series Hardware Specification

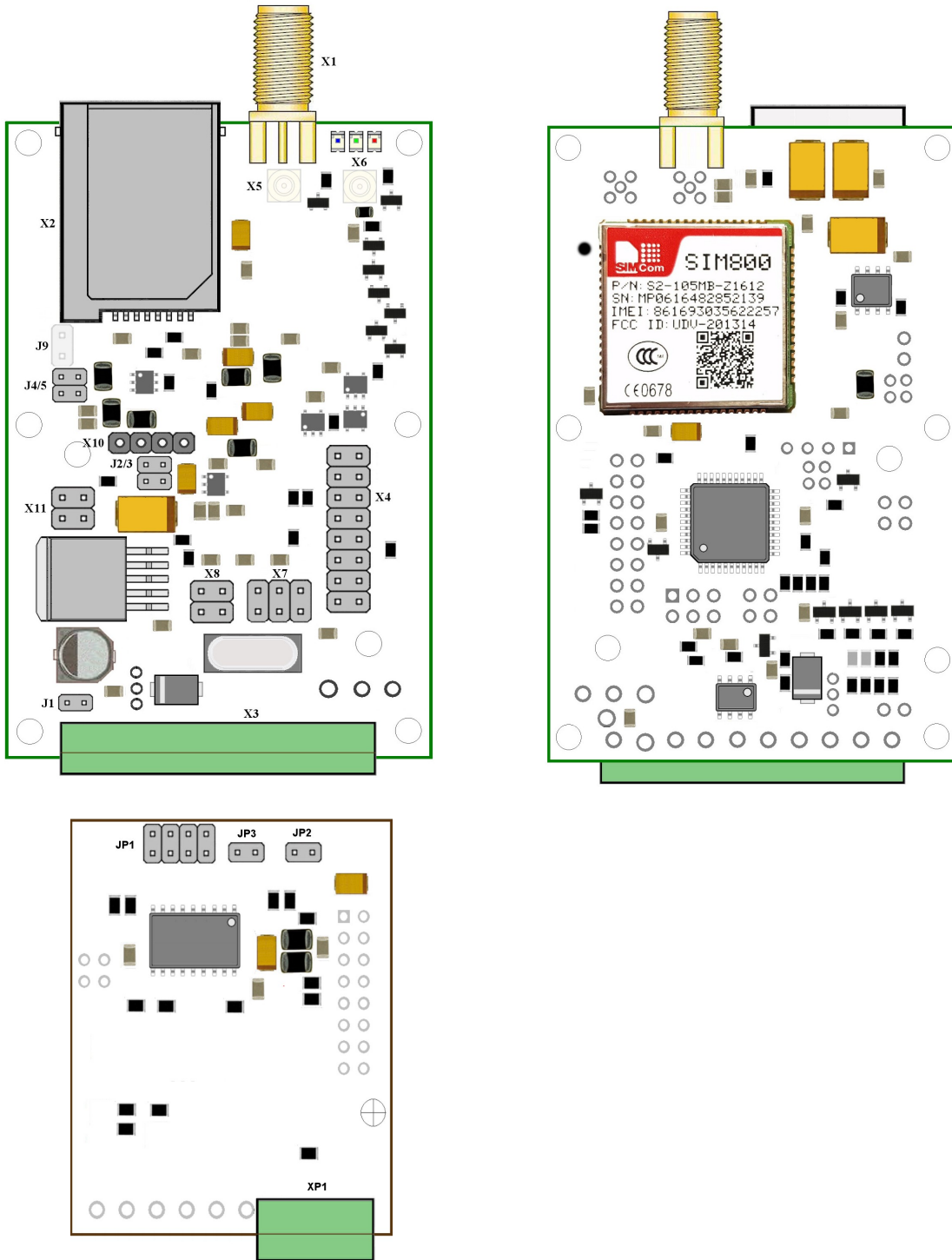
	BR900-ST	BR900-SMT	BR900-PT100		BR900-RF	BR900-GATE	BR900-GPS			BR928-DL
GSM band support	-3G 3G Dual-Band UMTS/HSPA 900/2100MHz and 2G Dual-Band GSM/GPRS/EDGE 900/1800MHz -2G 2G Quad-Band GSM/GPRS 850/900/1800/1900MHz									
Internal GSM module	SIM5300 / SIM800									
Data transmission	SMS	SMS	SMS		SMS	SMS	SMS/			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	4		1	4	2			6
- Events digital inputs	4	2	4		1	4	2			12
- Digital inputs even	0-1 or 1-0									0-1 and 1-0
- Digital signal filter	Yes									
Temperature sensor inputs										
Temperature sensor	-	SMT172	Pt100 (Pt1000 optional)		-	-	SMT172			SMT172
Temperature inputs	-	2	1 sensor (3 - optional)		-	-	2			2
Temperature input events	-	min/norm/max	min/norm/max		-	-	min/norm/max			min/norm/max
Temperature range	-	-45 to +99°C	0 to +150°C (ordered)		-	-	-45 to +99°C			-45 to +99°C
- Temperature filter		Yes	Yes				Yes			Yes
Analogue inputs										
Analogue inputs	1	1	-		-	-	1			3
Analogue Input range	0...10V	0...10V	0...10V		-	-	0...10V			0-10V
Analogue Input mode	0-5V/0-10V 0-20mA (optional)	0-5V/0-10V 0-20mA (optional)	0-5V/0-10V 0-20mA (optional)		-	-	0-5V/0-10V 0-20mA (optional)			0-5V/0-10V 0-20mA (optional)
- Analogue input events	min/norm/max	min/norm/max	-		-	-	min/norm/max			min/norm/max

GSM module BR900 series

- Analogue signal filter	Yes	Yes	-		-	-	Yes			Yes
	BR900-ST	BR900-SMT	BR900-PT100		BR900-RF	BR900-GATE	BR900-GPS			BR928-DL
Outputs										
- Open Drain MOSFET outputs	2 (20V/1A max) (30V/1A max)	2 (20V/1A max) (30V/1A max)	2 (20V/1A max) (30V/01A max)		-	2 (20V/1A max) (30V/1A max)	2 (20V/1A max) (30V/1A max)			2 (20V/1A max)
- 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	1 (optional) (30V/1A max) instead of MOSFET outputs			-
- Relay Output	-	-	-		-	-	-			1 (125Vac/24Vdc/0.5A)
- Wireless Outputs (AC remote switch control)	-	-	-		Up to 5					-
- Output control mode										
On-board monitoring										
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	-	-			-
Wiring										
Wiring Connections	10-way pluggable Screw Terminal	10-way Pluggable Terminal block	10-way Pluggable Terminal + 4-way		5.5/2.1 power connector; 2 way Terminal	10-way Pluggable Screw Terminal	10-way Pluggable Screw Terminal			2x10-way Double row pluggable Screw Terminal block
Power Supply										
Required Power External Supply	+5..12Vdc 14.5Vdc max stabilised	+5Vdc stabilised	+5..12Vdc 14.5Vdc max stabilised		+5Vdc stabilised	+5..12Vdc 14.5Vdc max stabilised	+5..12Vdc 14.5Vdc max stabilised			+12Vdc stabilised +11Vdc min +14.5Vdc max
Power requirement										
Minimum current recommended	1A	1A	1A		1A	1A	1A			1.2A
Voltage regulator	Internal voltage regulator									
Power protection	Reverse-polarity and over-voltage protection									
Environmental Conditions										
Operating temperature	-40...+85°C									
Dimensions										
Board dimensions	77.5x50.5mm									
Enclosure	optional	optional	optional		optional	optional	optional			optional

Hardware

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



Extension board BR-PT100

Power Supply

The BR900-PT100 operates from a stabilized +5...+12VDC (+14.5VDC max) power source. It draws less than 50mA standby, less than 300mA rms and 2A peak typ. (3A max.). Power supply input has reverse polarity and over-voltage protection.

GSM antenna connector

GSM antenna must be connected to SMA female connector X1. Use only the 50Ohm 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.

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.

Note:

- The BR900 can only be used with small SIM-cards with 1.8V/3V.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 SIM5300/SIM800 status indication - GREEN LED (LED2)
- GPS module SIM28 – BLUE LED (LED3) for BR900-GPS version only

Module LED indication (Red LED)

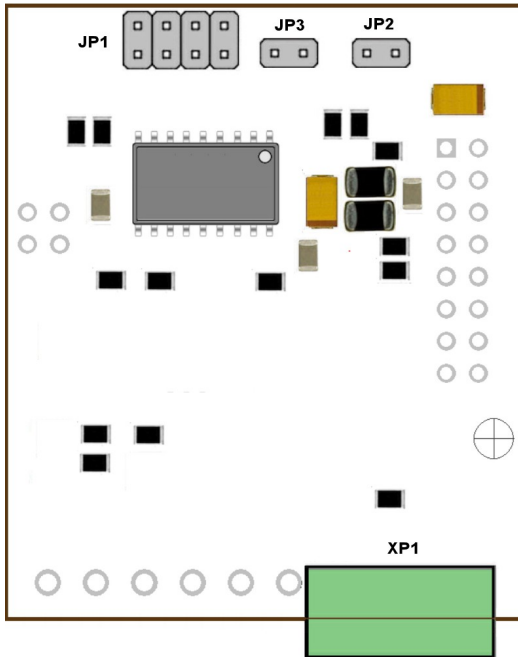
LED status	Modem status
Permanently off	Device off
Short blinking after power on and after 1 min periodic blinking	SIM card read process
Short blinking (period 5-6 sec)	Module in work
Permanently on	Module work with modem

GSM Module SIM900 LED GSM status indication (Green LED)

LED status	Modem status
Off	GSM module 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

BR-PT100 extension board



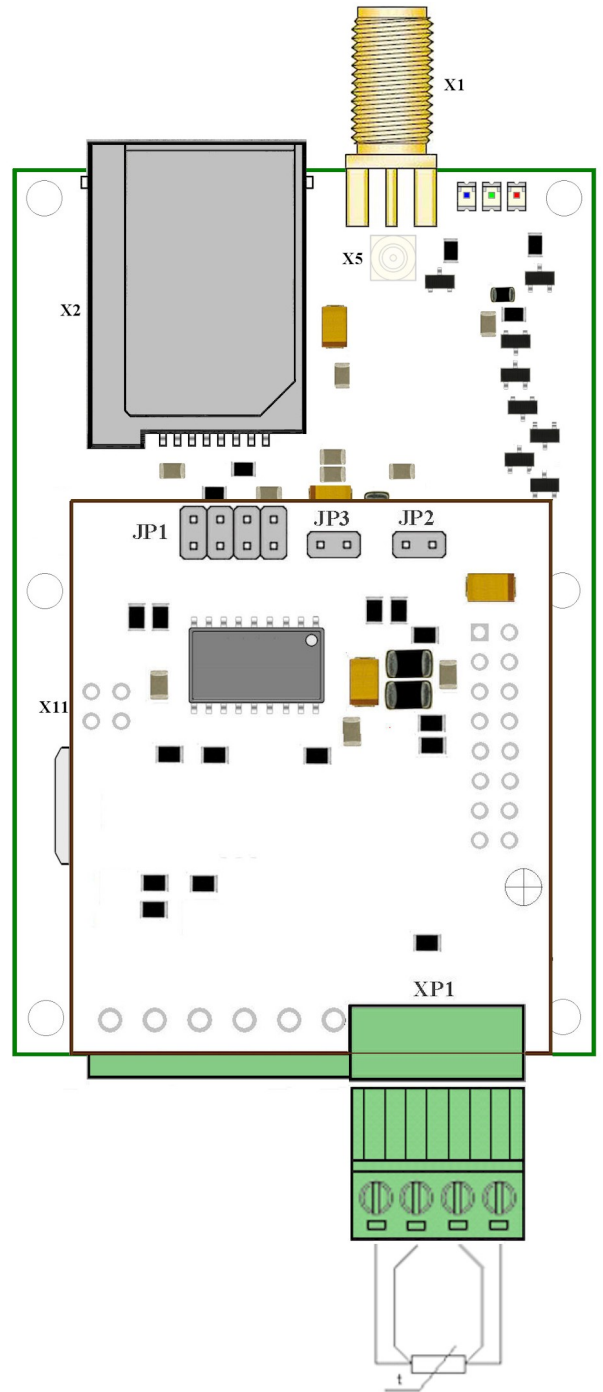
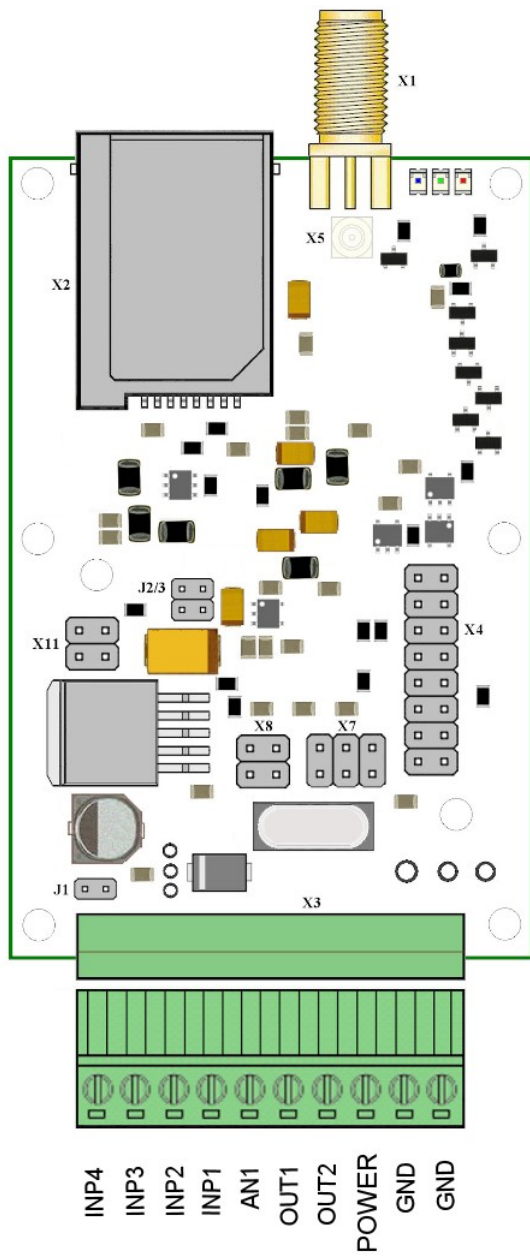
XP1 – pluggable terminal for temperature sensors connections
JP1 - mode select for one 4-wire sensor or 1, 2, 3 2-wire sensor connection
JP2 - for 2wire sensor used (see “BR-PT100 extension board and temperature sensors connections”)
JP3 - for 2wire sensor used (see “BR-PT100 extension board and temperature sensors connections”)

BR900 base board

The BR900 consist 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 holder
- X3 – Pluggable 10-ways terminal block for power supply and external input/outputs signal connection
- X4, X11 – Pin headers for Pt100 extension board connection
- X5 – optional MMCX (f) connector for MMCX to SMA bulkhead GSM antenna cable for any other enclosure
- X6 – Only for BR900-GPS version
- X7 – ISP interface connector for Firmware programming
- X8 – Control point
- J1 – Jumper for connection INP4 to GND.
- J2/J3 – Jumpers for firmware mode setting
- J4/J5 – Not used

GSM module BR900 series



Jumpers

Jumper J1 - set input 4 to GND

Jumper J2 – BLUE -

Jumper J3 – RED - Set default password 2345:
 set jumper
 power ON
 after 5sec power OFF
 remove jumper

Jumper J4/5 - not used

BR-PT100 extension board and temperature sensors connections

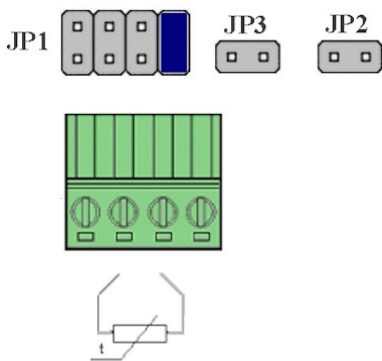
BR-PT100 extension board for connection and temperature measurement.
Standard version support 1 Pt100 (Pt1000) temperature sensor.

Ordered version can connect up to 3 temperature sensors.

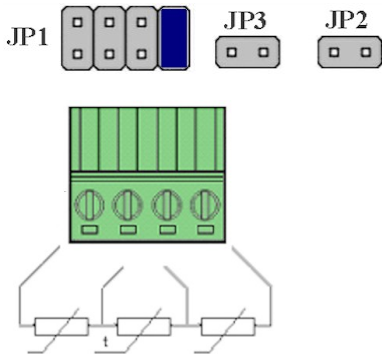
Can connect:

- one 2-wire temperature sensor
- one 4-wire temperature sensor (optional)
- two 2-wire temperature sensor (optional)
- three 2-wire temperature sensor (optional)

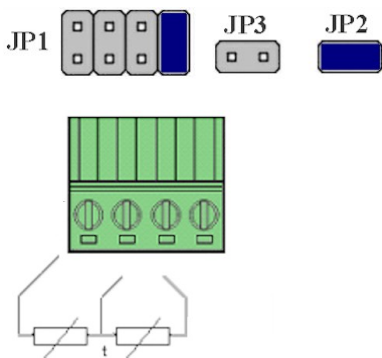
One 2-wire temperature sensor



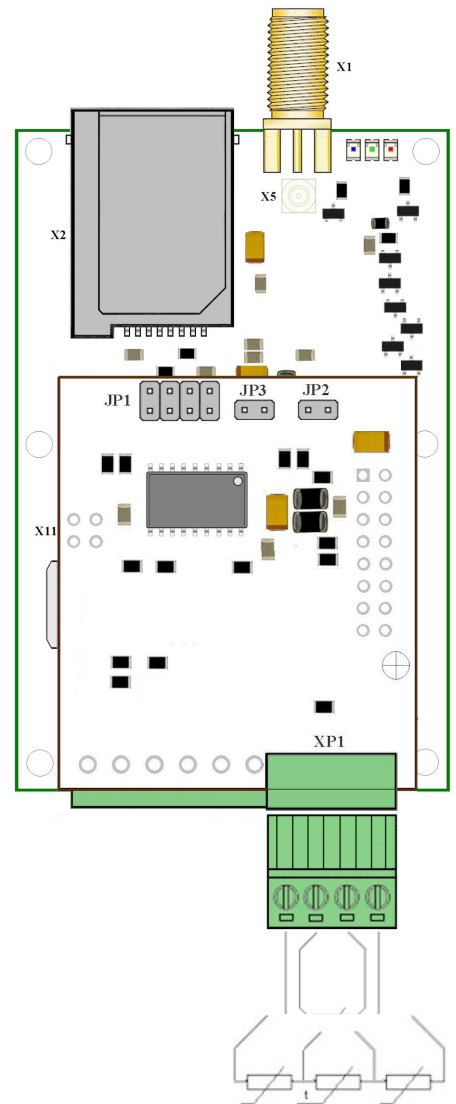
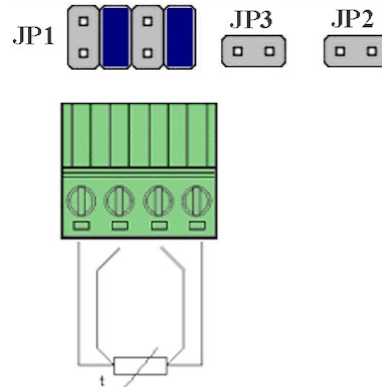
Three 2-wire temperature sensor (optional)



Two 2-wire temperature sensor (optional)



One 4-wire temperature sensor (optional)

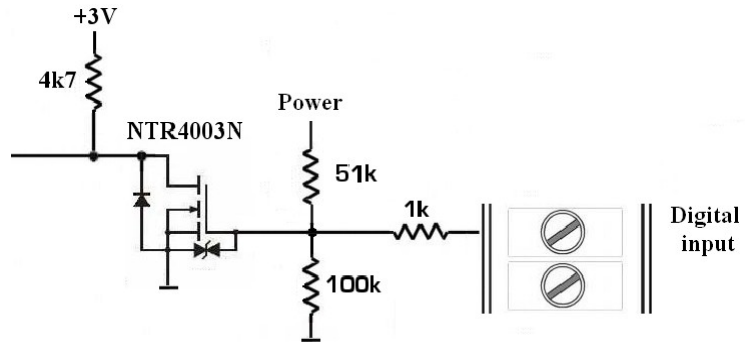


Inputs and Outputs

Inputs

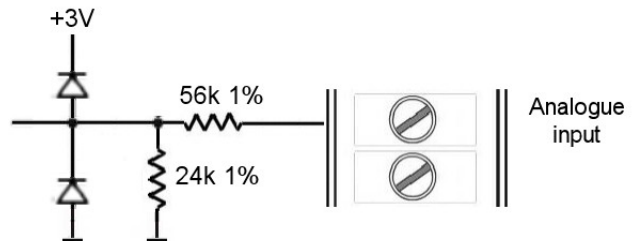
Digital Transistor Inputs

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



Analogue Inputs 1

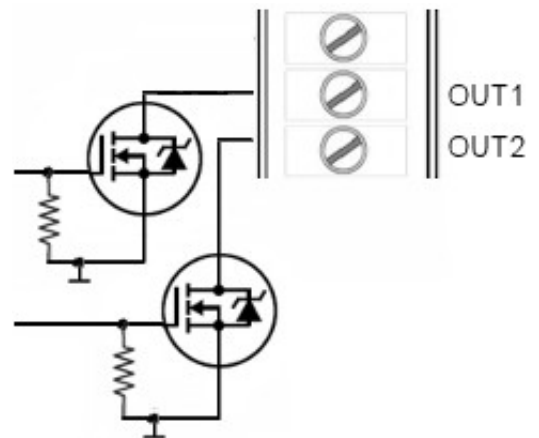
Connector: Pluggable screw terminal block (for analog input1)
 Input type: CMOS
 Input Voltage: 0 to +10V max



Outputs

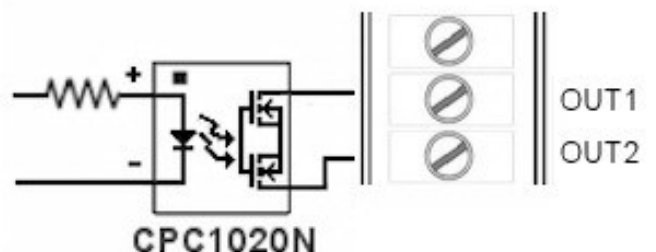
MOSFET Open Drain Outputs

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

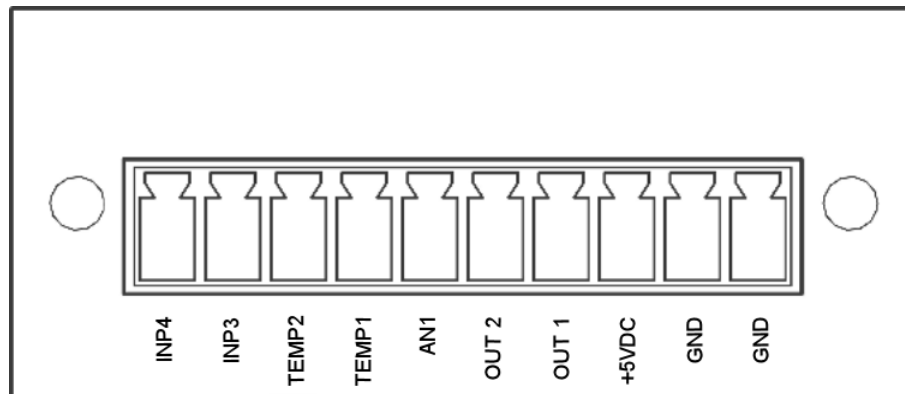
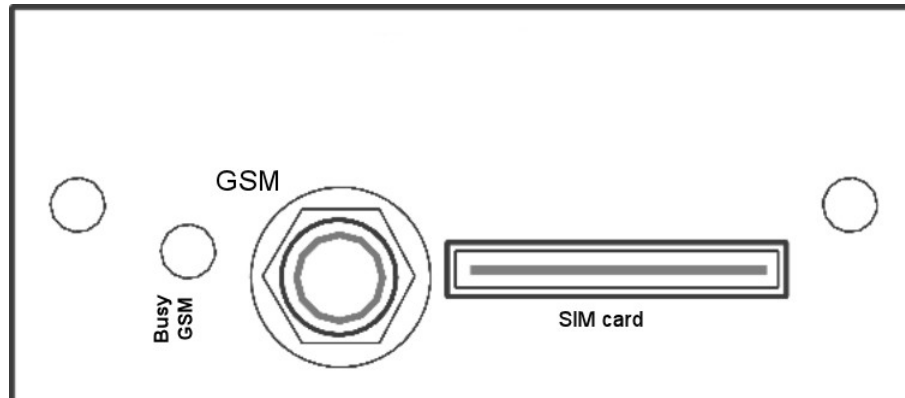


GSM module BR900 series

Enclosure (optionally)

For BR900-PT100 version used Fischer Elektronik aluminium enclosure AKG 55 32 80 ME (optionally).

- BR900-PT100 dimensions: 50.5x77.5mm
- Enclosure AKG 55 32 80 ME dimension 54 x 80 x 32 mm



Programming

Digital signal monitoring

	Open input	Connection to GND	Connection to Power supply	Event all 0-1	Event all 1-0 default
Digital input 1	'0'		'1'	0-1	1-0
Digital input 2	'0'		'1'	0-1	1-0
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 2345V01 and 2345V10

Default - 1-0

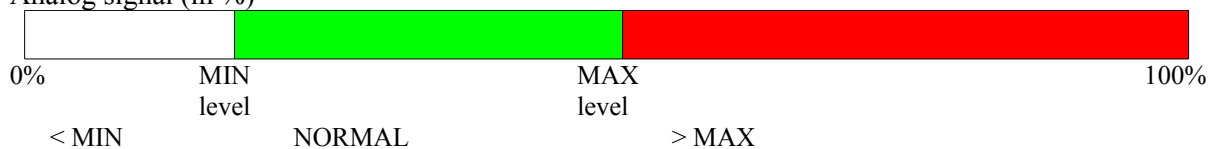
Analogue signal monitoring

Supply voltage monitoring

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

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

Analog signal (in %)



For supple voltage monitoring -

Alarm text SMS constantly:

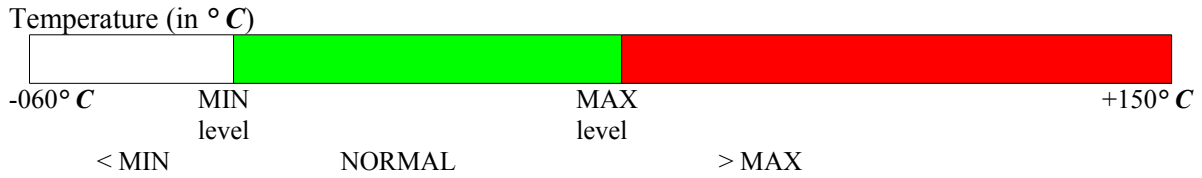
Voltage low

Voltage high

Voltage normal

Temperature monitoring

Can set minimum and maximum setpoints. For temperature range $-60^{\circ}\text{C} \dots +150^{\circ}\text{C}$
You can set setpoint in range from -60C to $+150\text{C}$



Alarm SMS for temperature mode (example)

Temperature high
T= $+39\text{C}$

SMS command

SMS command	Answer SMS	Function
Temperature control and monitoring		
2345L-010	(setpoints info)	Set minimum temperature level in °C default:
2345H+030		Set maximum temperature level in °C default:
2345F1	(setpoints info)	Timeout filter for temperature 0: 30sec, 1: 5min ... 9: 45min; default 1
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
Get information		
2345i	(information) T=122.0 B=12.1V I1=0 I2=0 I3=1 I4=1 O1 OFF, O2 OFF T:-10 +29 F:1 B:100 150	Read information – temperature in °C internal supply voltage inputs outputs temperature setpoints temperature timeout filter internal supply voltage setpoints
Set/Reset Outputs; Timer Outputs; only for Output 1 (previous version Out.3)		
2345S1 ... 2345S2	(information)	Set output **)
2345R1 ... 2345R2	(information)	Reset output **)
Phone Numbers for alarm SMS		
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		
2345X3,Input 1	3:Input 1	Set text message for temperature events, digital inputs 1,2,3,4 and for internal analog. Text up to 26 characters (see Text SMS message table)
2345X9		Clear text
Analog Inputs		
2345M,100	(setpoints info)	Set setpoints for minimum analog level for B in V x10 (see table) default: B = 100 (10.0 V)
2345Y,150	(setpoints info)	Set setpoints for maximum analog level for B in V x10 (see table) default: B = 150 (15.0 V)

GSM module BR900 series

Password change		
2345P2010	Psw: 2010	Change password; use only 0,1,2,3,4,5,6,7,8,9 default password 2345 if you forgot password, use jumper for restore default password 2345 If you forgot password, you can restore default password with RED jumper J3 1) set RED jumper J2 2) power ON 3) after 5 sec remove RED jumper J3
2345V01 2345V10	information	Set event 0-1 for digital inputs Set event 1-0 for digital inputs (default)

Text SMS message

SMS command	Text (length up to 26 char)
2345X0,	Temperature high
2345X1,	Temperature low
2345X2,	Temperature normal
2345X3,	Input 1
2345X4,	Input 2
2345X5,	Input 3
2345X6,	Input 4
2345X7,	Battery high
2345X8,	Battery low
2345X9,	Battery normal

Numbers

Example for numbers in EEPROM (with SMS command 2345N and 2345C)

Nr in EEPROM	numbers
1	+37122842913
2	+37122842914
3	+37122842915
4	

Number consist + and country code before phone number