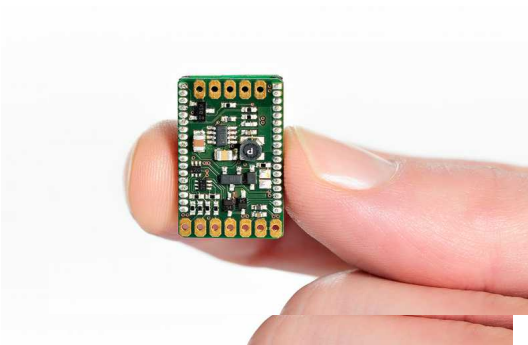
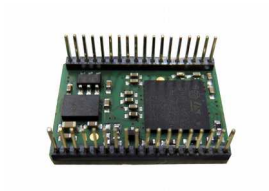


# 1...6-channel measurement amplifier GSV-6

GSV-6CPU, GSV-6L, GSV-6K  
Instruction manual



*GSV-6L: 12V/24V supply, output current / voltage*



*GSV-6CPU: 3.7V supply, output 0...3V; CAN, UART, 6x ADC*



*GSV-6K: 12V/24V supply, output current / voltage*

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Version: 21.06.2017

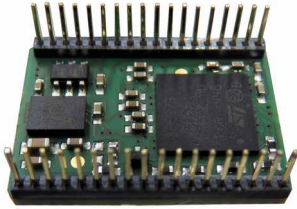


## Strain gauges measurement amplifier GSV-6

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## GSV-6CPU



### Description

The GSV-6 product range handles signal processing for strain gauges within the smallest of spaces.

The core component of the GSV-6 is a PCB measuring 19mm x 14mm.

This "GSV-6CPU" provides all the required functions to set up a 1- to 6-channel measurement amplifier.

Connector panels and functions for additional applications are expanded via 18-pin strips with a 1.0 pitch: UART to Bluetooth, CAN bus driver, GPRS modem, etc.

The GSV-6 CPU comes complete with 6 input channels (even before any expansion). One channel includes bridge excitation and differential input to operate strain gauge full bridges.

- Strain gauge bridge excitation 3V, max. 60mA
- Strain gauge bridge input
- Analogue output 0-2.5V
- LED output
- TEDS input
- Digital inputs for the "Tare" and "Scale" functions
- 5x analogue inputs 1.5V  $\pm$ 1.45V (nominal)
- Interfaces "UART", "CAN", "I2C" <sup>1)</sup> "SPI" <sup>1)</sup>
- Supply voltage 3.6V to 5.5V
- 3x Threshold value indicators 4mA
- 3.3V Voltage output 10mA
- 2.5V Reference 100 $\mu$ A

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1) SPI and I2C without software support to date



## Dimensions

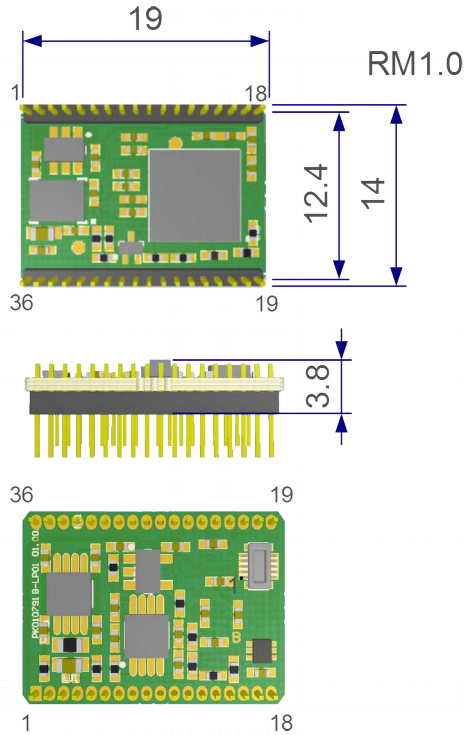


Figure 1: Dimensions GSV-6CPU

The GSV-6 CPU module can be configured via an UART configuration interface. There is also scope to configure the most important settings using the Tare and Scale cables.

## Terminal assignment

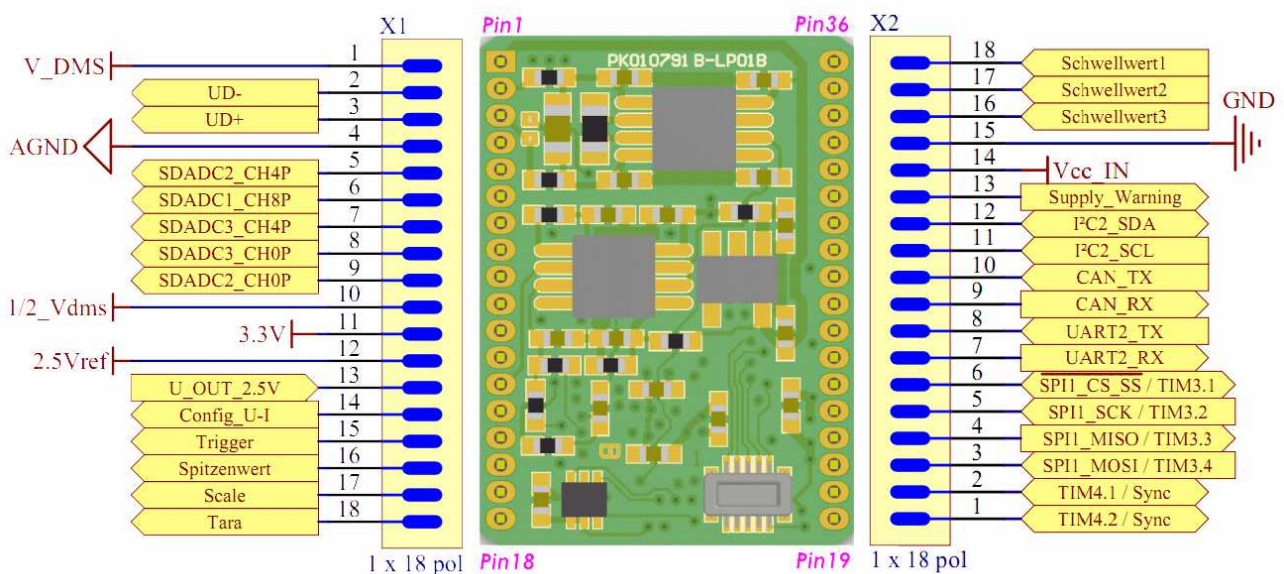


Figure 2: Terminal assignment GSV-6CPU

## Configuration interface

A JTAG and UART interface is available for testing and development via a "BM10B" plug connector.

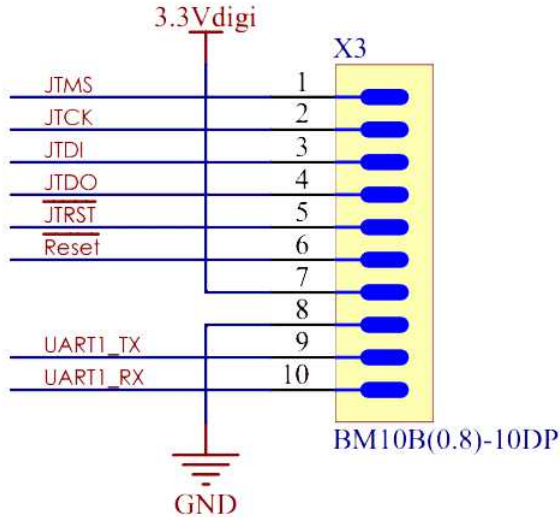


Figure 3: Terminal assignment configuration interface

## Strain gauges

PIN	Designation	Function	Comment
1	+Us (V_DMS)	Positive bridge excitation 3 V	60 mA, short-circuit proof
2	-Ud	Negative bridge output	
3	+Ud	Positive bridge output	
4	-Us (AGND)	Negative bridge excitation (AGND)	

## Voltage supply

PIN	Designation	Function	Comment
14	Vcc_IN	Supply voltage	3.6 V ... 5.5 V
15	GND	Ground supply voltage	
13	Supply_Warning	For shutting down external hardware	To be connected to Vcc_IN

## Inputs/outputs

PIN	Designation	Function	Comment
18	$\overline{\text{Tare}}$	Tare > 1s in actual-value mode: Zero adjustment Tare > 100ms in maximum-value mode maximum-value reset Tare > 2s in maximum-value mode: Zero adjustment	

PIN	Designation	Function	Comment
		and maximum-value reset Tare > 100ms in ClickRClackR menu: "Up", goes to next menu entry.	
17	Scale	Scale > 2s: Scaling of the output signal to the currently effective signal at the input. Default: set at 100% of the output signal. The autoscale level can be configured to values other than 100% in the ClickRClackR menu and via the service interface. Scale > 5s when power switched on: Activate the ClickRClackR menu Scale > 100ms in ClickRClackR menu: "Enter", executes the current menu entry.	
16	$\overline{\text{TEDS}}$ (Peak value)	The connection for 1-wire-EEPROMs functions with 3.3V instead of 5V and includes a 1.5 k $\Omega$ pull-up resistor of 3.3V. The EEPROMs (e.g. DS2433+, DS2430A, DS28EC20) of Maxim/Dallas are 3.3V compatible. The software supports TEDS sensors with the Bridge Sensor ID 33 and Strain-Gage ID 35 templates.	
	LED	Status indicator, with signals including "TEDS read", "Parameter active", "Parameter set", "Gradient indicator".	max. 4mA, 200 ohm series resistor;
	Temperature sensor	Type TMP102, -40°C ...+125°C, $\pm 3^\circ\text{C}$ ;	

## GSV-6L

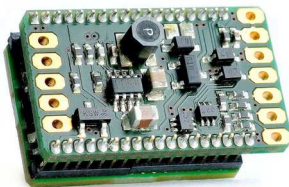


Figure 4: GSV-6L

### Description

The measurement amplifier GSV-6L adds a configurable analogue output to the GSV-6CPU. The GSV-6L is designed to be built into sensors and fits into the most confined housing enclosures, such as connector housings of the "GSV-6K" type. Even after it is enclosed, there is complete scope to configure all the properties of the GSV-

6L via two "Tare" and "Scale" control cables.

The calibration data from the electronic data sheet of the sensor is automatically accepted via a TEDS input. The analogue output is then automatically adjusted to the increase set in TEDS. Dimensions and terminal assignment

## Dimensions

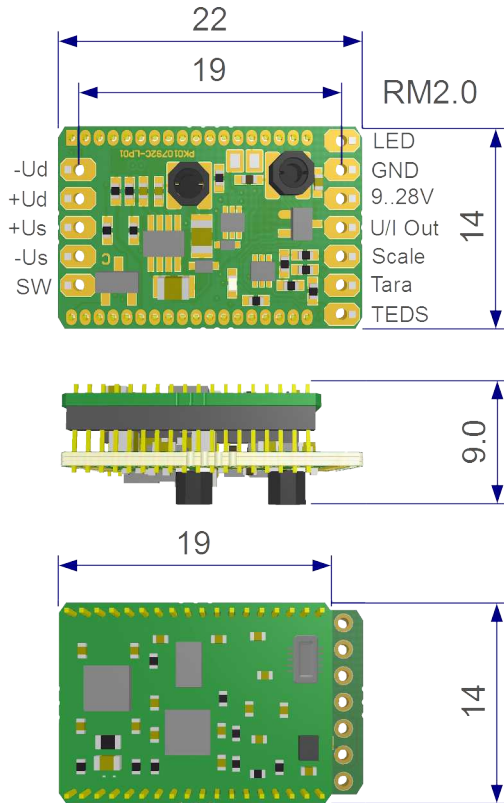


Figure 5: Dimensions GSV-6L

## Terminal assignment

### 5-pin terminal strip

Designation	Function	Comment
+Us (V_DMS)	Positive bridge excitation 3 V	60 mA, short-circuit proof
-Ud	Negative bridge output	
+Ud	Positive bridge output	
-Us (AGND)	Negative bridge excitation (AGND)	
SW	Threshold value output, OpenDrain 200mA, 30V	



## 7-pin terminal strip

Designation	Function	Comment
LED	Connection for LED	max. 4mA, 200 ohm series resistor;
GND	Ground supply voltage	
9...28V	Supply voltage	with polarity reversal protection
U/I Out	Negative bridge excitation (AGND)	9...28V or 2V over the maximum output signal;
Scale	Control lead for Scale or "ENTER"	High Active; duration as for GSV-6CPU
Tare	Control lead for "Tare" or "UP"	High Active; duration as for GSV-6CPU
TEDS	Input for TEDS	as GSV-6CPU

## Functions

The functions can be adjusted using the "Tare" and "Scale" control cables.

A simulator to configure the GSV-6 via control cables is also available via

[https://www.me-systeme.de/produkte/elektronik/gsv-6/anleitungen/ba-clickrclackr\\_en.pdf](https://www.me-systeme.de/produkte/elektronik/gsv-6/anleitungen/ba-clickrclackr_en.pdf)

Function	Settings
Analogue output "Type"	0...10V, $\pm 10V$ , 0...5V, $\pm 5V$ , 4...20mA, 0...20mA
Analogue output "Offset"	0%, 10%, 12.5%, 20%, 25%, 30%, 37.5%, 40%, 50% Example: an offset of 50% with an analogue output 0...10V shifts the zero point at 0 mV/V to 5V. With an output of 4...20mA, the zero point is shifted to 12mA with an offset of 50%. The input sensitivity is shown at all times on the remaining "End Value - Offset" area.
Data frequency in Hz (Updating of measurement values at the analogue output or interface)	0.1, 0.2, 0.5, 1, 2, 10, 20, 50, 100, 200, 500, 1k, 2k, 5k, 10k, 20k, 25k; The smallest data frequency at the output is 10Hz. At levels below 10Hz, a second-order IIR filter is used.
Input sensitivity in mV/V	0.1, 0.2, 0.3, 0.4, 0.5, 1, 2, 3, 4, 5, 8 (standard mode) 0.1, 0.2, 0.3, 0.4, 0.5, 1, 2, 3, 4, 5, 8 (high-res. mode) In high-res. mode the physical measuring range is restricted, which means there is less "reserve" available for a zero adjustment with the Tare function. Available physical measuring ranges: 8 mV/V, 4 mV/V, 2 mV/V, 1 mV/V The input sensitivity can also be set to 5-digit precision using the Tare and Scale cables in the ClickRClackR menu ("seamless").



Function	Settings
Adjust autoscale level	The autoscale level allows the output signal to be defined as a % of the end value, which is shown by implementing "Scale" with the current weight limit. Default setting: 100% (a weight limit of 100% is expected). The autoscale level can be adjusted in stages, from 5% within the range 0 to 100%. When "0%" is set, the autoscale function is deactivated.
Level for threshold value indicator "On"	The switch-on threshold of the threshold value indicator can be adjusted in steps of 5% within the range 0 to 100%. When 0% is set, the threshold value indicator is deactivated.
Level for threshold value indicator "Off"	The switch-off threshold of the threshold value indicator can be adjusted in steps of 5% within the range 3 to 98%. The switch-off threshold should be set lower than the switch-on threshold. If "0%" is set, the switch-off threshold is deactivated.
Operating mode	"Actual value display" (Default), Maximum value display, Inversion of the display, Non-volatile Tare setting (default) or volatile when switched off, "Gradient" setting (special function, not included in the standard configuration), TEDS activated (default) / deactivated.
Load pre-setting	Selecting this menu option loads the default settings included on delivery. $\pm 10V$ , 2 mV/V, 100Hz, Actual value display, TEDS active, Non-inverted display,

## GSV-6K



### Description

The measurement amplifier GSV-6K includes a strain gauge input via a 5-pin M12 casing bushing and an analogue output via a 5-pin M12 housing connector.

The GSV-6K is used to convert the bridge signal from force, torque or strain sensors to an analogue output signal.

The electronic data sheet of the sensor can be read via a TEDS interface. The measurement amplifier scales the output signal to the end value of the set output signal using the TEDS interface.



The output signal can be set as a voltage output or current output.

The outputs 0...10V,  $\pm 10V$ , 0...5V,  $\pm 5V$ , 4...20mA, 0...20mA can be set using the "Tare" and "Scale" control cables.

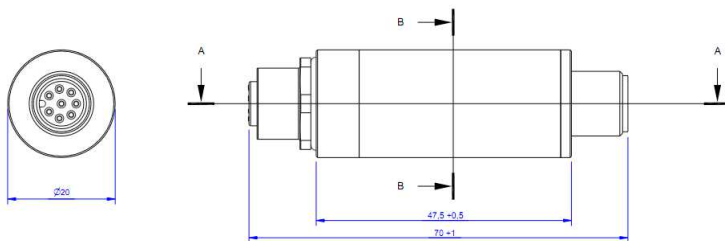
Similarly, an offset or sampling frequency can also be set.

## Functions

The unit is factory-configured to the desired output signal and with the desired functions. The configuration can be modified using the "Tare" and "Scale" control cables.

Functions(Page 8).

## Dimensions



## Terminal assignment

M12 plug connector with A-coding;

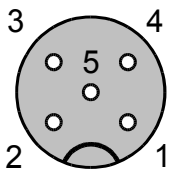


Figure 6: Contact configuration M12 socket

## 5-pin socket

Pin No.	Terminal assignment	ME (Type 1)	ME (Type 2)	Phoenix SAC-5P
1	+U <sub>s</sub> Positive bridge excitation	brown	red	brown
2	-U <sub>s</sub> Negative bridge excitation	white	black	white
3	+U <sub>D</sub> Positive differential input	green	green	blue
4	-U <sub>D</sub> Negative differential input	yellow	white	black
5	TEDS input	grey		grey

TEDS GND is connected with -U<sub>s</sub> (Pin 2).

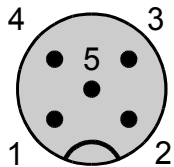


Figure 7: Contact configuration M12 plug

## 5-pin plug

Pin No.	Terminal assignment	ME (Type 1)	Phoenix SAC-5P
1	Voltage supply 12V / 24V DC	brown	brown
2	Analogue output 4...20mA / $\pm 10V$	white	white
3	Ground	green	blue
4	Tare (Control input for zero adjustment)	yellow	black
5	Scale (Control input for autoscale)	grey	grey



## Annex

### Technical data of GSV-6CPU

<b>Accuracy</b>		
Accuracy class	0,1	%
Resolution	16	Bit
Strain gauge inputs for full bridge	60 ... 20000	Ohm
Input sensitivity (FS)	0.1 ... 8 (configurable)	mV/V
Common-mode rejection ratio DC-60Hz 5 kHz	110 100	dB dB
Noise amplitude "Pk-Pk" 1 Hz 10 Hz 100 Hz 1 kHz 10 kHz	20 µV/V (2 mV/V / 10000) 31 µV/V (2 mV/V / 6500) 80 µV/V (2 mV/V / 2500) 140 µV/V ( 2 mV/V / 1400) 240 µV/V ( 2 mV/V / 840)	
Zero point drift (at 2 mV/V FS)	<0.05 %FS/10K (1 µV/V / 10K)	
Sensitivity drift (at 2 mV/V FS)	<0.01%RD/10K	
Analogue input Number Resolution Input range (nominal) Zero point drift	6 16 1.5V ± 1.45V 150 µV / 10K	Bit V
<b>Measuring frequency</b>		
Updating of analogue output	10 ...25000	Hz
Sampling frequency	50	kHz
Adjustment range of averaging filter	0.1 ...25000	Hz
<b>Outputs</b>		
Bridge supply voltage Current carrying capacity Short-circuit resistance	3.0 60 Yes	Volt mA
Analogue output Resolution Output resistance Max. output current	1.5 V ± 1 V at 0 mV/V ± FS 13 bit 47 10	Ohm mA
Threshold value output, Supply_Warning LED Level Current carrying capacity:	LVTTL level 200 ohm series resistor required >2.4V High; <0.4V Low 4	mA



Voltage source Current carrying capacity	3.3 10	V mA
<b>Interfaces</b>		
	UART, SPI, I2C, CAN, TEDS	
<b>Voltage supply</b>		
Nominal voltage	3.7	V
Current consumption	12	mA
Min. supply voltage	3.6	V
Max. supply voltage	5.5	V
<b>Operating temperature</b>		
Nominal temperature	-10°C ...85°C	
Working temperature	-40°C ... 125°C	
<b>Dimensions</b>		
L x W x H	19 x 14 x 4	mm x mm x mm
<b>Protection Class</b>		
	IP00	

#### Technical data GSV-6L / GSV-6K

<b>Accuracy</b>		
Accuracy class	0,1	%
Resolution	16	Bit
Strain gauge inputs for full bridge	60 ... 20000	Ohm
Input sensitivity (FS)	0.1 ... 8 (configurable)	mV/V
Common-mode rejection ratio		
DC-60Hz	110	dB
5 kHz	100	dB
Noise amplitude "Pk-Pk"		
1 Hz	20 µV/V (2 mV/V / 10000)	
10 Hz	31 µV/V (2 mV/V / 6500)	
100 Hz	80 µV/V (2 mV/V / 2500)	
1 kHz	140 µV/V ( 2 mV/V / 1400)	
10 kHz	240 µV/V ( 2 mV/V / 840)	
Zero point drift (at 2 mV/V FS)	<0.05 %FS/10K (1 µV/V / 10K)	
Sensitivity drift (at 2 mV/V FS)	<0.01%RD/10K	
<b>Measuring frequency</b>		
Updating of analogue output	10 ...25000	Hz
Sampling frequency	50	kHz
Adjustment range of averaging filter	0.1 ...25000	Hz



<b>Outputs</b>		
Bridge supply voltage Current carrying capacity Short-circuit resistance	3.0 60 Yes	Volt mA
Analogue output Resolution Output resistance Max. output current	Configurable 13 bit 0.12 10	Ohm mA
Threshold value output, Current carrying capacity:	Open drain 200 mA, 30V	
<b>Interfaces</b>		
	TEDS	
<b>Voltage supply</b>		
Nominal voltage Current consumption Min. supply voltage Max. supply voltage	12V ... 24V 22 9 28	V mA V V
<b>Operating temperature</b>		
Nominal temperature	-10°C ... 70°C	
Working temperature	-25°C ... 85°C	
<b>Dimensions</b>		
GSV-6L (L x W x H) GSV-6K (Ø x L)	22mm x 14mm x 9mm / Ø20mm x 70mm	
<b>Protection class</b>		
GSV-6L GSV-6K	IP00 / IP66	

## Factory settings

	GSV-6L, GSV-6K
Input sensitivity	2 mV/V
Physical measuring range	±4 mV/V (standard mode)
Analogue output	±10 V (±1 V)
Offset	0% (1.5 V)
Data frequency	100 Hz
Sampling frequency	50 kHz
Signs	Not inverse
Level for scale	100%



Level for threshold value indicator 1	90%
Zero adjustment	non-volatile
TEDS	activated
Peak value output	inactive
Gradient	$\pm 1$ (mV/V) / s
Configuration interface	115200 baud, 8n1

## Changelog

Version	Changes
25.11.16	updated formatting of document
21.06.17	Analog input 1.5V +-1.45V

Subject to changes.

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