

PMA SG 45

Transmitter for load cells, strain gauges and melt pressure sensors

Overview

The Uniflex SG 45 is a transmitter for processing and monitoring input signals from strain gauges, load cells, melt pressure sensors, and resistance bridges. It can be used in practically all industrial applications involving the precise measurement, indication, and processing of force, weight, or melt pressure. Moreover, it permits operation and parameter adjustment via keys in the front panel. Alternatively, the Uniflex SG 45 can be operated, parametrized, and calibrated by means of a PC and a connection adapter. This also permits the adjusted parameters and configuration to be documented during operation.

The simple zero setting function ensures high operating convenience.

Key Features

- Compact design, only 22.5 mm (0.87") wide
- Clips onto top-hat DIN rail
- Plug-in screw terminals or spring-clamp connectors
- Dual-line LC display with additional display elements
- process values always in view
- Convenient 3-key operation
- Direct communication between mounted controllers, fieldbus connections via bus coupler
- Measurement input with high signal resolution (23 bits)
- Universal high-resolution output (14 Bit) as combined voltage/current output
- Two relay outputs
- Quick response; only 50 ms cycle time, suitable for fast signals
- Customer-specific linearization
- Dead load compensation and tare adjustment
- Min/max indicator ('slave pointer')
- Preset for output value
- Zero setting with adjustable limit value

Description

The input of the SG 45 has a high resolution for mV signals as well as a supply voltage for energizing strain gauges and sensors fitted with resistance bridges (e.g. load cells and pressure sensors). Up to four load cells with 350 Ω each can be connected and processed. Hereby, the scaling function converts the mV signals directly into the measured value. The input-signals can be linearized or adapted according to a table with up to 31 segments. Moreover, the SG 45 permits the direct connection of a melt pressure sensor. For this operating mode, the SG 45 also provides a contact for switching the sensor's 80% calibration resistor. The universal output for standard signals and two relays are standard features. Galvanic isolation is provided between inputs and outputs as well as from the supply voltage and the communication interfaces.

Mounting

The compact SG 45 is clipped onto a top-hat DIN rail, and can also be unmounted very simply. All connections are of the plug-in type, so that a controller can be replaced very quickly without disturbing the wiring.

Display and operation

The two-line LC display permits simultaneous indication of the measured value and all of the unit's operating

functions. Moreover, a LED and 4 other display elements give a reliable indication of operating status, operating mode, and error messages.

The user-configurable engineering unit of the measured value can be included in the display. By means of the extended Operating Level, it is possible to show any signal or parameter in the 2nd display line.

Interfaces and Engineering Tools

The transmitter settings are also configurable by means of an Engineering Tool. Via the BlueControl® software, including the transmitter simulation and especially the convenient connection via the Blue-Port® front interface, the user can solve the task in hand without having to work through operating instructions.

Of course, practically all settings can also be made from the device front.

Moreover, the SG 45 can exchange data with superordinate systems and PCs via an optional RS 485 interface with MODBUS RTU protocol that is fitted into the top-hat DIN rail.

Devices with option system interface can be connected via bus coupler to fieldbusses.

Password protection

If required, unauthorized access to the various Operating Levels can be prevented with a password, or an entire level can be blocked.



TECHNICAL DATA

INPUTS

Survey of inputs

SIGNAL INPUT INP1

Accuracy: 0,01% with 25°C
 Decimal point: 0 to 3 decimals
 Input filter: adjustable 0.0..999.9 s
 Scanning cycle: 100 ms (only INP1) 140 ms (INP1 + INP2)
 Linearisation: 31 segments, adaptable with BlueControl®
 Measurement value correction: 2-point or offset
 Limiting frequency: 1,7 Hz
 Input circuit monitoring: sensor break, polarity, (for 6-wire connection) short circuit
 Connecting principle: 4-wire bridge 6-wire bridge (sense line)

Input signal range

Span start and span: anywhere within the measurement range
 Scaling: freely selectable, -1999...9999

Measurement span

Slope/ sensitivity with $U_s = 10V$
 0.5 mV/V 5 mV
 1mV/V 10 mV
 2mV/V 20 mV
 4 mV/V 40 mV

DIGITAL INPUT DI 1

Operation as: Contact input

Connection of a potential-free contact that is suitable for switching 'dry' circuits.
 Switched voltage: 5 V
 Current: 0.5 mA

Function

Configurable as direct or inverse switch or push button!
 Functions:
 Operation disabling, reset of stored alarms and the min/max indicator (slave pointer), enabling the tare function, batching, reset, dead load compensation, and zero setting.

OUTPUTS

SURVEY OF OUTPUTS

Output	Purpose
OUT,1 OUT2 (Relay)	Limit contacts, alarms, fault, status messages *
OUT3 (Continuous)	Analog output for display value, INP1

*All logic signals can be "OR-linked". Output values can also be forced via interface.

RELAY OUTPUTS OUT1, OUT2

Contact type: 2 normally open with common contact connection
 Max. contact rating: 500 VA, max. 250 V, max. 2A at 48...62 Hz, ohmic load
 Min. contact rating: 6V, 1 mA DC
 Switching cycles for $I=1A/2A$: ? (electrical): 800,000/500,000 (at~250V)

Note:

If the relays OUT1, 2 and 3 are used to operate external contactors, these must be fitted with RC snubber circuits to manufacturer specifications to prevent excessive voltage peaks at switch-off.

OUT3 AS UNIVERSAL OUTPUT

Parallel current/voltage output with common 'minus' terminal (combined use only in galvanically isolated circuits).

Freely scalable Resolution: 14 bits
 Dynamic response Output follows the input:
 (step change of input signal) T90: Output follows the input within 300 ms

Tracking error I/U: $\leq 2\%$
 Residual ripple: $\leq \pm 1\%$
 (rel. to range end) 0...130 kHz

Current output

0/4...20 mA, configurable. Short circuit proof
 CONTROL range: -0,5...23 mA
 Load: $\leq 700 \Omega$
 Load effect: $\leq 0,02\%$
 Resolution: $\leq 1,5 \mu A$
 Error: $\leq 0,1\%$

Voltage output

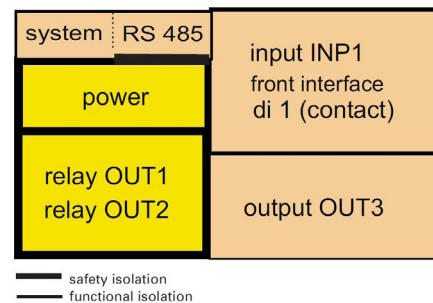
0/2...10V, configurable not continuous short-circuit proof

Dynamic range: -0,15...11,5 V
 Load: $\geq 2 \Omega$
 Load effect: $\beta 0,06\%$
 Resolution: $\beta 0,75 mV$
 Error: $\beta 0,1\%$
 Additional error when using simultaneously the current output $\beta 0,09\%$

GALVANIC ISOLATION

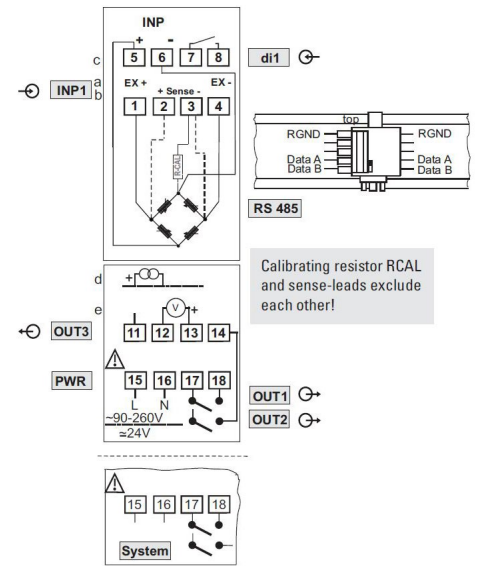
Galvanic isolation is provided between inputs and outputs as well as from the supply voltage (3-port-isolation).

Fig. 1: Galvanic isolation



Test voltage:	
Between power supply and in-/outputs:	2.3 kV AC, 1 min
Between input and output:	500 V AC; 1min
Isolation	
Between in-/output against earth:	$\beta 33V$ AC

Fig.2: Electrical connections SG 45



FUNCTIONS

Process value functions

Resolution: 23 bits
 Measurement cycle: 50 ms DC
 signal: mV DC signal: mV

Sensitivity / sensor	Span
0.5 mV/V	5 mV
1mV/V	10 mV
2mV/V	20 mV
4mV/V	40 mV

Input resistance: 1 MΩ

Display error: = 0.1 % ± 1 digit

Customer specific linearisation

Up to 31 segments / 32 data points, only configurable with BlueControl® (not via the front panel).

Interference at input

(acc. to DIN IEC 770 6.2.4)
 Common mode interference: negligible
 Series mode interference: no effect from 1 Vrms with 10 mV

STRAIN-GAUGE BRIDGE SUPPLY (US)

10 VDC, max. 125 mA
 Correction via 'sense' lead

Signal processing

The selected input signal is converted into an analog output signal or is accessible at the interface.

- Tare adjustment by suppression of empty weight / preload
- Scaling
- 1st-order filter with adjustable parameters (bandwidth, see below)
- Linearization with 31 segments

Behaviour on sensor break/short circuit

- Response of the analog output is selectable (upscale / downscale)
- Preset substitute input value, can be disabled

Tare function (option)

Setting the tare signal the actual process value is reset to zero. Further measurements work with the offset, e.g. to subtract the tare weight.

Zero setting

Special tare function for "permanent" shift of the zero point and for monitoring the measuring range. The function can be enabled via a digital input, a limit value, the interface, or by means of a front key combination.

Min/max indicator (slave pointer)

The minimum and maximum input values are stored in the CI 45, and can be displayed by means of the keys D (minimum) and I (maximum). The values are resettable.

Dead load compensation

Dead load compensation is practically the same as zero setting, except that the data are stored permanently in the unit's configuration.

Integrator

The function is implemented as a load value integral. The function can be reset via a digital input, a limit value, the interface, or by means of a front key combination.

Dosing

Recipe handling

The batching function can be enabled via a digital input, a limit value, the interface, or by means of a front key combination.

Display of engineering units

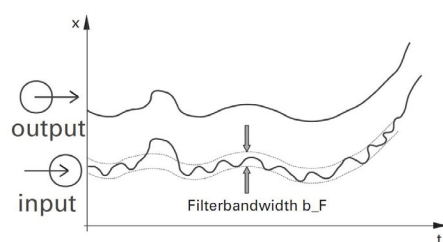
The engineering unit for the measured value can either be selected from a predefined list of standard units, or it can be defined by the user (BlueControl®). The unit appears in the second line of the display.

CALIBRATION FUNCTION

This function permits switching of the calibration resistor that is fitted into melt pressure sensors. This enables the sensor function to be checked. Furthermore, the function can be used for scaling the sensor while it is being commissioned.

FILTER

Every input is fitted with a 1st-order filter that is adjustable for time constant or bandwidth. The bandwidth is the adjustable tolerance range within which the filter is active above and below the process value. Measurement value changes in excess of the adjusted bandwidth are not filtered.



LIMIT VALUE FUNCTIONS

3 limit values available.

– MAX, MIN or MAX + MIN in phys. units, adjustable.

Hysteresis

–Parameter adjustable in engineering units.

Discriminator (interference suppression)

–Adjustable from 0...9999 s.

Signalling

–Via red LED in the housing front (lights up on alarm)

–Via switching output (configured as NO or NC contact)

FUNCTIONS

Functions

- Input value monitoring
- Input value monitoring with storage
- Signalchange / with storage
- Resetting via front or digital input
- Alarm discriminator adjustable from 0. 9.999 seconds
- Several limit values and alarm messages can be logically "OR-linked".
- Limits can be used as control signals.
- Zero shift limiting

ALARMS

Sensor break / short circuit

Depending on the selected input type, the input circuit is monitored for break, short circuit, and reversed polarity.

MAINTENANCE MANAGER

Display of error messages, warnings, and stored limit value messages in the error list. Messages are stored, and can be reset manually.

Possible elements in the error list:

Sensor break, short circuit, incorrect polarity
Stored limit values
E.g. Re-calibration warning (message is generated when a predefined operating time is reached)
E.g. Maintenance interval for a switching device (message is generated when a predefined number of switching cycles is reached)
Internal fault (RAM, EEPROM, ...)

DISPLAY AND OPERATION

Display

LCD:

dual-line plus additional display elements

Upper line:

4 digits, 7-segment LCD

- for process value

Lower line:

5 digits, 14-segment LCD; configurable contents (via BlueControl®)

- Setpoint
- Output value
- Engineering unit
- Parameters
- Extended Operating Level

Additional display elements

4 display elements (bars in the lower line of the LCD)

- Marked 1 & 2: OUT1 / OUT2
- Marked F:

Function active (e.g. TARA)

- Marked E:

Entry has been made in the error list

Dual-color indicator LEDs:

Green:	OK
Green, blinking:	no data exchange with bus coupler (only for devices with system option)
Red:	limit value Lim1 exceeded
Red, blinking:	internal fault, configuration mismatch

Operating functions

Only three keys at the front of the SG 45 are used to operate process values, parameters, and configuration data. Different Operating Levels and selected parameters can be disabled by means of BlueControl®.

POWER SUPPLY

Depending on ordered version:

AC supply

Voltage:	90...260 V AC
Frequency:	48...62 Hz
Consumption:	approx. 7 VA max.

Universal supply 24 V UC*

AC supply:	18...30 V AC
Frequency:	48...62 Hz
DC supply:	18...31 V DC
Consumption:	approx. 4 VA/3 W max.

Supply only from safety electrical low voltage (SELV).

> cULus class II only!

* Devices with system option:

They are supplied via the bus connector from bus coupler or power supply module.

Behaviour with power failure

Configuration and parameter settings:

Permanent storage in EEPROM

BLUEPORT® FRONT INTERFACE

Connection to the controller front via a PC adapter (see 'Additional Accessories'). The BlueControl® software enables the SG 45 to be configured, parameters set, and operated.

BUS INTERFACE (OPTIONAL)

RS 485

Connection via bus connector fitted in the top-hat rail. Screened cables should be used.

Galvanically isolated

Type:	RS 485
Transmission speed:	2,400, 4,800, 9,600, 19,200, 38,400 bits/sec
Parity:	even, odd, none
Address range:	1...247
Number of controllers per bus segment:	32

Protocol:

- MODBUS RTU

SYSTEM INTERFACE

For connection to fieldbus couplers (see system components) Connection via bus connector fitted in the top-hat rail. Technical data see data sheet 9498-737-50911.

ENVIRONMENTAL CONDITIONS

Protection mode

Front panel:	IP 20
Housing:	IP 20
Terminals:	IP 20

Permissible temperatures

For specified accuracy:	-10. 55°C
Warm-up time:	< 20 minutes
Temperature effect:	≤ 0.05%/ 10K
add. influence to cold junction compensation:	≤ 0.05% / 10 K
Operating limits:	-20...60°C
Storage:	-30...70°C

Humidity

Max. 95%, 75% yearly average, no condensation

Shock and vibration

Vibration test Fc (DIN EN 60 068-2-6)

Frequency:	10...150 Hz
Unit in operation:	1g or 0.075 mm
Unit not in operation:	2g or 0.15 mm

Shock test Ea (DIN EN 60 068-2-27)

Shock:	15 g
Duration:	11 ms

Electromagnetic compatibility

Complies with EN 61 326-1 for continuous, unattended operation.

Interference radiation:

- Within the limits for Class B devices.

Immunity to interference:

- Complies with EN 61 326-1 for continuous, unattended operation.

GENERAL

Housing front

Material: Polyamide
PA 6.6 Flammability class: VO (UL 94)

Connecting terminals

Material: Polyamide PA
Flammability class: V2 (UL 94) for screw terminals
VO (UL 94) for spring-clamp terminals and bus connector

Electrical safety

Complies with EN 61 010-1

Over-voltage category II Contamination degree 2

Protection class II

CE marking

Meets the European Directives regarding „Electromagnetic Compatibility“ and „Low-voltage equipment“ (see also „Safety tests“)

cUL certification

(Type 1, indoor use) File: E 208286

For compliance with UL certificate, the following information must be taken into account:

- Use only 60/75°C copper (Cu, 12-30 AWG) conductors.
- Tighten the terminal-screws with a torque of 0.5 – 0.6 Nm.
- Max. ambient temperature: 55 °C
- Max. ratings of relay contacts: 250VAC, 2A (resistive)
- Power supply from class II

Electrical connections

Plug-in connector strips with choice of terminal type:

- Screw terminals or spring-clamp terminals, both for lead cross-sections from 0.2 to 2.5 mm². (AWG24-12)

Mounting method

Clip-on rail mounting (35 mm top-hat rail to EN 50 022).

Locked by means of metal catch in housing base.

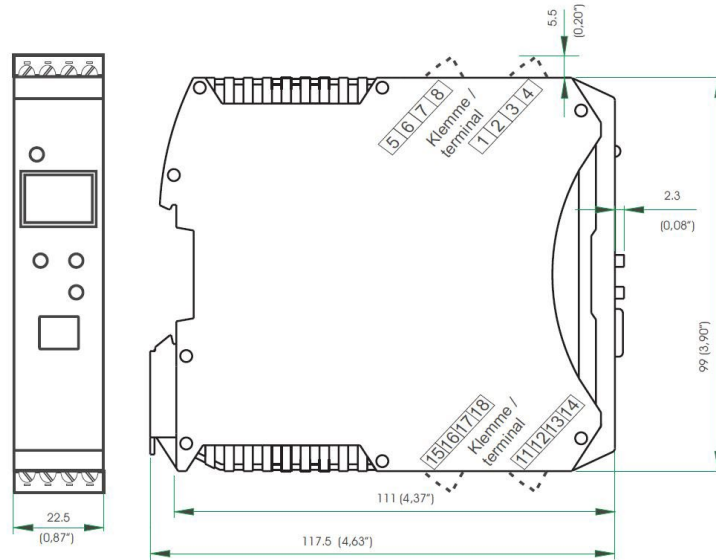
Close-packed mounting possible.

Mounting position: vertical

Weight:

200g

Fig. 4: Dimensions SG 45



ACCESSORIES

BlueControl® (Engineering Tool)

PC software package for configuring, parameter setting, and operating (commissioning) the SG 45. Moreover, all settings are saved and can be printed, if required.

Depending on version, a powerful data acquisition module with trend graphics is available.

Show/hide function

The BlueControl® software enables any number of parameters and configuration setting to be shown/hidden. This ensures that only permitted parameters & settings can be changed in the controller. Safety-relevant parameters are not displayed.

Simulation function

The built-in simulation serves to test the settings.

Configuration settings accessible only via BlueControl® software

- (not via the controller's front keys)
 - Customer-specific linearization
 - Enable forcing for inputs and outputs
 - Setting the limits for operating hours and switching cycles
 - Blocking operator functions, Operating Levels, and password definition
 - Text setting
 - Definition of the display contents

Fig. 5: Hiding of interface parameters: only the address is visible

Name	Description	Visible
othr	Other	<input checked="" type="checkbox"/>
bAud	baudrate	<input type="checkbox"/>
Addr	address	<input checked="" type="checkbox"/>
Prty	parity	<input type="checkbox"/>
dELV	answer delay [ms]	<input type="checkbox"/>
D.Uni	display unit	<input checked="" type="checkbox"/>
O2	parameter unit for O2	<input checked="" type="checkbox"/>
Unit	unit	<input checked="" type="checkbox"/>
dP	decimal points	<input checked="" type="checkbox"/>
SEGm	display segment assignment	<input checked="" type="checkbox"/>
C.dEL	modem delay [ms]	<input checked="" type="checkbox"/>

Table 1: BlueControl®: Versions and functions

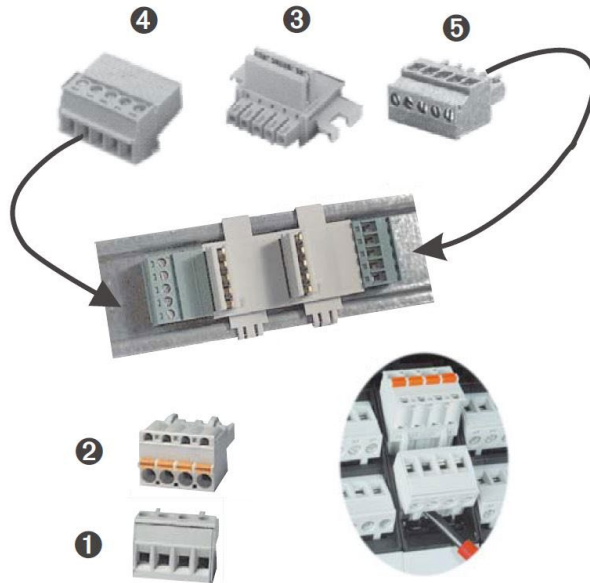
FUNCTIONALITY	MINI	BASIC	EXPERT
Parameter and configuration setting	Yes	Yes	Yes
download: writes an engineering to the device	Yes	Yes	Yes
online-mode / visualisation	SIM only	Yes	Yes
creation of user defined linearizations	Yes	Yes	Yes
configuration of extended operation level	Yes	Yes	Yes
upload: reads an engineering from the device	SIM only	Yes	Yes
basic diagnosis function	No	No	Yes
saves files and engineering data	No	No	Yes
printer function	No	Yes	Yes
Online documentation, help	Yes	Yes	Yes
measurement correction (calibration procedure)	Yes	Yes	Yes
data acquisition and trend function	SIM only	Yes	Yes
personal assistant function	Yes	Yes	Yes

Hardware requirements:

A special PC adapter (see 'Accessories') is required for connecting to the transmitter.

Updates and demo software from: www.west-co.uk

Fig. 6: Accessory parts



ACCESSORIES

Description	Quantity	Order no.
① Connector set with screw terminals	4 pieces	9407-998-07101
② Connector set with spring-clamp terminals	4 pieces	9407-998-07111
③ Bus connector for fitting in top-hat rail	1 piece	9407-998-07121
④ Plug for bus connection, inverted, connections at left, horizontal cable entry	1 piece	9407-998-07131
⑤ Plug for bus connection, connections at right, vertical cable entry	1 piece	9407-998-07141

ADDITIONAL ACCESSORIES

Description	Language	Order no.
PC adapter for the BluePort ® front interface		9407-998-00001
USB serial adaptor (USB to RS 232)		
Converter RS 232 to RS 422/485	galv. isolated	ADAM-4520-D
BlueControl ® Mini	German/English	www.west-cs.de
BlueControl ® with Basic license rail line	German/English	9407-999-12001
BlueControl ® with Expert license rail line	German/English	9407-999-12011

ORDERING DATA

Transmitter UNIFLEX SG 45	S	G	4	5	-	1	-	0	0	-	00
1 measuring input, 1 digital input with display and BluePort interface											
without plug-in connector terminals						0					
with screw terminal connector						1					
with spring clamp terminal connectors						2					
90..260V AC, mA/V/logic + 2 relays							4				
18...30VAC/18..31VDC, mA/V/logic +1 relay							5				
no option								0			
RS 485 / MODBUS - protocol								1			
System interface (only for 24V versions)								2			
Standard configuration									0		
Configuration to order									9		
Standard (CE-certification)										0	
cULus - certification											U

Additional system components for units with system interface

Fieldbus couplers

CANopen	RL40-111-00000-U00
PROFIBUS DP/DPV1	RL40-112-00000-U00
MODBUS RTU	RL40-113-00000-U00
Ethernet MODBUS/TCP	RL40-114-00000-U00
Profinet IO	RL40-115-00000-U00

Power supply module RL40-119-00000-U00

* see Rail Line system datasheet

Documentation

<https://www.west-cs.co.uk/resources-uk/>

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WEST
Control Solutions

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