Proportional amplifier type EV2S

Product documentation

Line connector

Supply voltage U_B:	10 ... 30 V DC
Output current $I_{A\ max}$:	2 A

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HAWE HYDRAULIK

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Table of Contents

1 Overview of proportional amplifier type EV2S

Proportional amplifiers actuate proportional solenoid valves by converting an input signal into a corresponding control current.

The proportional amplifier type EV2S has been developed for direct mounting onto a solenoid valve as a line connector.

It is suitable for controlling proportional single-action and twin solenoids. The feedback measurement at the valve outputs identifies and corrects the effects of temperature and the power supply. This ensures that the valve behaves in a reproducible, precise manner.

Important parameters (e.g. input signal, minimum current, maximum current, dither, ramp times etc.) can either be set using the pushbutton and an integrated display or via CAN bus using software on the computer or via Bluetooth using the smartphone app.

Proportional amplifier type EV2S

Features and advantages

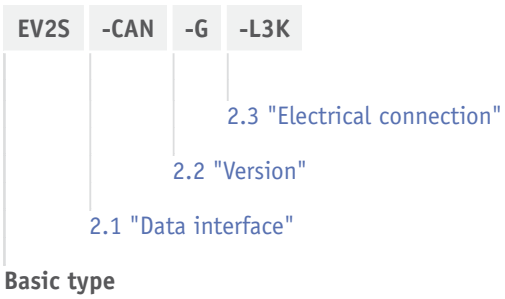
- Direct assembly onto the solenoid valves
- Easy commissioning
- Up to two analogue inputs for target value signals
- Control of twin and single valves
- CAN bus interface
- Bluetooth interface (optional)
- Simple diagnostics and status monitoring
- Functions and settings tailored to HAWE products

Intended applications

- Mobile machines and in the industry sector
- Connection of analogue proportional valves in CAN bus networks
- Closed control circuits
- Simple expansion of existing systems

2 Available versions

Ordering example



2.1 Data interface

Coding	Description
CAN	CAN interface
BT	Bluetooth interface, CAN interface Not approved in China due to local legal regulations

2.2 Version

Coding	Description
G	Line connector for single-action and twin solenoids with socket according to EN 175 301-803 A
DG	2x line connector for 2 single-action solenoids with socket according to EN 175 301-803 A Not for data interface **BT** (see Chapter 2.1, "Data interface")
G18	Line connector rotated 180° for single-action and twin solenoids with socket according to EN 175 301-803 A

2.3 Electrical connection

Coding	Description
L3K	3 m cable with open line ends 5x 0.5 mm². Not for data interface **BT** (see Chapter 2.1, "Data interface")
M	M12 plug, 5-pole, only for version G (see Chapter 2.2, "Version")

2.4 Accessories

PEAK-System CAN-USB dongle

Order coding	PCAN-USB ADAPTER
Order number	6964 0021-72
Description	USB-CAN adapter from PEAK-System. For connecting an EV2S to a PC. Please download the driver software from www.hawe.com/edocs to guarantee problem-free operation.

Line connector adapter from DIN A to DIN B

Order coding	ADAPTER FORM A – FORM B
Order number	6217 0238-00
Description	Adapter for controlling industrial standard DIN form B solenoids using an EV2S.

Initial commissioning kit

Order coding	EV2S-DEVELOPMENT-KIT
Order number	6964 0009-08
Description	**For commissioning** ▪ Consists of a 24 V DC power supply unit ▪ 9-pole D-Sub plug including termination for CAN bus connection to a PC (PEAK-USB ADAPTER required) ▪ M12 plug ▪ Terminals for connecting the EV2S

M12 connector

Order coding	M12 plug, can be assembled
Order number	6217 0284-00
Description	M12 connector without cable, with screw terminals, for connecting an individual cable

2.5 Software

Programming

The EV2S is delivered with firmware. Logic and functions must be programmed or parametrised via logical linking of the inputs and outputs. Without programming or parameterisation, the EV2S does not function.

Smartphone app

Order coding	HAWE eControl
Description	Simple connection: The electric amplifier EV2S-BT can connect to an Apple iPhone or Android smartphone via Bluetooth. The HAWE eControl app is available for free from the Apple App Store or Google Play Store. **Function** ▪ Commissioning ▪ Live data for diagnostics and monitoring ▪ Change, save and duplicate settings ▪ Send or receive saved settings

HAWE Visual Tool

Designation	HAWE Visual Tool
Description	The free software HAWE Visual Tool offers a clear graphic representation of all inputs and outputs. By configuring user parameters, functions can be created with a clear logic. The communication takes place via the PEAK-System CAN-USB dongle.
Functions	Configuration and scaling of inputs and outputs Configuration of the CAN communication Logical linking of inputs and outputs Copying of settings
Download	www.hawe.com/edocs

HAWE eDesign

Designation	HAWE eDesign
Description	The free software HAWE eDesign is a graphic programming interface. Pre-defined functions and logic modules can be combined extremely easily to create a program even without knowledge of programming. HAWE eDesign is a pure Cloud solution that requires no compiler installation on the computer. The communication takes place via the PEAK-System CAN-USB dongle.
Functions	Programming of functions and logic Worldwide access to programs Configuration and scaling of inputs and outputs
Website	eDesign.hawe.com

3 Parameters

3.1 General data

Designation	Proportional amplifiers
Version	Line connector
Connection	▪ 3 m cable 5x 0.5 mm² ▪ M12, 5-pole
Attachment	On socket according to EN 175 301-803
Installation position	any
Protection class	IP 65 (mounted) according to DIN VDE 0470, EN 60529 or IEC 529
Temperatures	▪ **CAN:** -40 to +80°C ▪ **BT:** -40 ... +70 °C

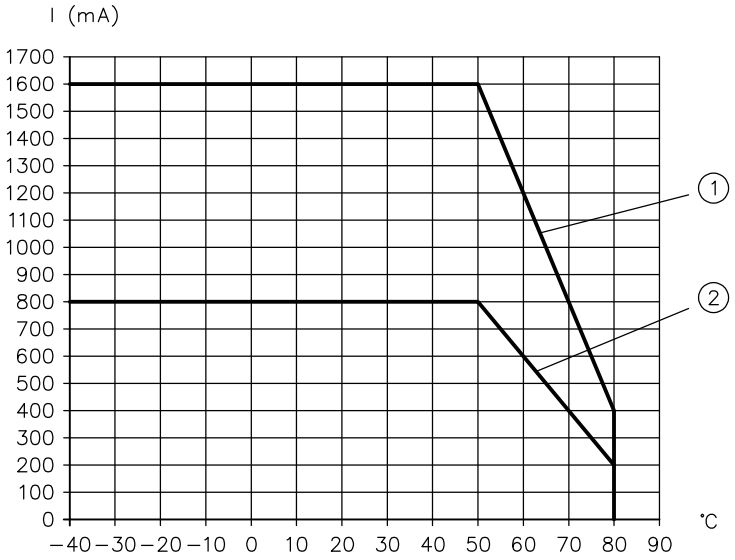
3.2 Weight

	Type	
	EV2S	= approx. 70 g

3.3 Electrical data

Supply voltage	U_B	10 to 30 V DC, protected against reverse polarity
output voltage	U_A	U_B – 0.5 V, pulse-width modulated
Output current	**uncontrolled**	
	I_A	Short-circuit-proof, temperature-dependent
		- CAN: 0 ... 2 A - BT: 0 ... 1.6 A
	controlled	
	I_A	0 to 1.6 A, short-circuit-proof, temperature-dependent, see "Temperature-dependent power during continuous operation"
Adjustment areas	I_{min}	0 ... 1 A
	I_{max}	- CAN: 0 ... 2 A - BT: 0 ... 1.6 A
Idle current	I_L	- CAN: < 35 mA - BT: < 60 mA
Possible signals	**Input 1**	
		▪ 0 to 5 V DC, R_E = 36 kΩ ▪ 0 to 10 V DC, R_E = 36 kΩ ▪ 4 to 20 mA, R_E = 220 Ω ▪ 0.25 to 0.75 U_B, R_E = 24 kΩ ▪ PWM, R_E = 36 kΩ
	Input 2	
		▪ 0 to 5 V DC, R_E = 24 kΩ ▪ 0 to 10 V DC, R_E = 24 kΩ ▪ CAN bus ▪ ±10 V DC, R_E = 24 kΩ
Recommended target value potentiometer	$R \leq 10$ kΩ	
Ramp time	t_R	0 to 300 s Increase and decrease time can be adjusted separately
Dither frequency	f	50 to 250 Hz
Dither amplitude	l	0 to 100%
PWM frequency	f	50 to 1000 Hz, temperature-dependent

Temperature-dependent power during continuous operation



°C ambient temperature; I current (mA)

1 12 V systems

2 24 V systems

3.4 Communication

CAN bus

CAN protocol	CANopen, J1939
CAN bit rate	10, 20, 50, 100, 125, 250, 400, 500, 800, 1,000 (all units in kbit/s)
CAN-ID	1 to 127 (default ID = 126)

Bluetooth

Bluetooth protocol	Bluetooth 4.0 Low Energy

3.5 Electromagnetic compatibility (EMC)

The EMC of the device was tested by an accredited testing laboratory (emitted interference according to DIN EN 61000-6-3 and immunity to interference according to DIN EN 61000-6-2 evaluation criterion “B”). The test set-ups only represent typical use. This EMC testing does not release the user from carrying out adequate prescribed EMC testing of their complete system (according to Directive 2014/30/EU). If the EMC of the complete system must be further amplified, the following measures can be tested and introduced:

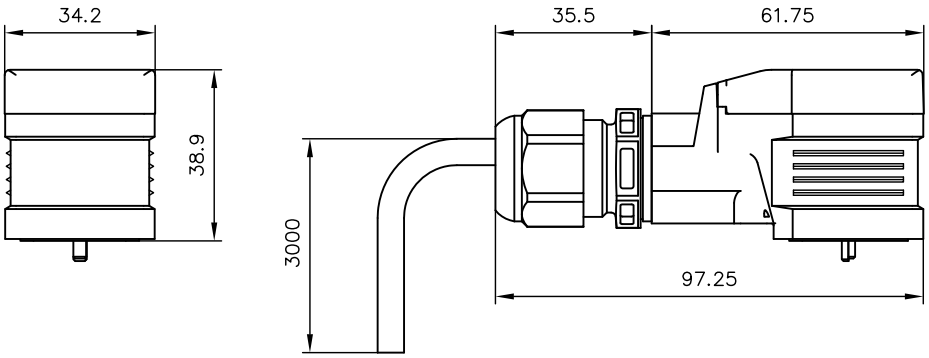
- Supply lines, such as inputs and outputs to and from the device, should be as short as possible. If necessary they should be shielded and twisted in pairs (to reduce the antennae-like effect for increasing the immunity to interference).

The EMC of the device in variant BT was tested by an accredited testing laboratory in accordance with EN 301489-17.

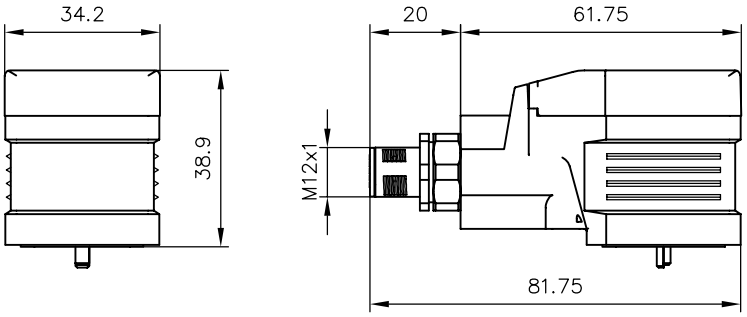
4 Dimensions

All dimensions in mm, subject to change.

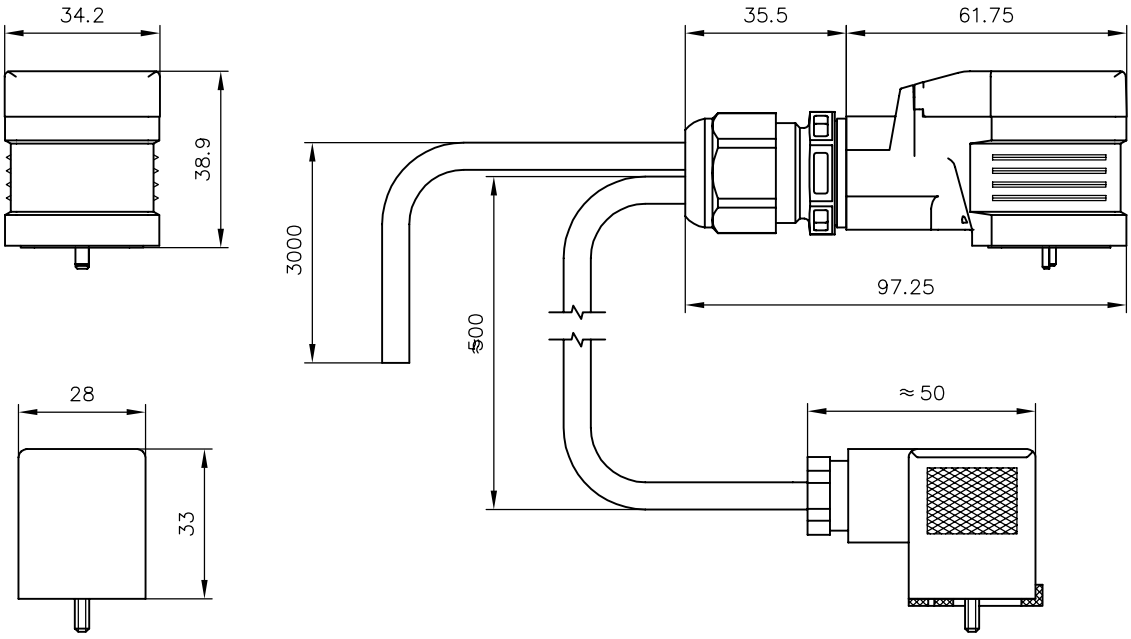
EV2S-CAN-G-L3K



EV2S-CAN-G-M, EV2S-BT-G-M



EV2S-CAN-DG-L3K



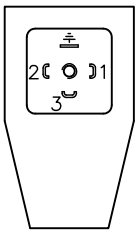
5 Installation, operation and maintenance information

5.1 Electrical connection

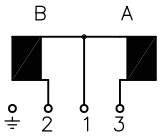
Connection pattern (magnet-side)

Port	3-pin
Protection class	IP 65 according to EN 60529

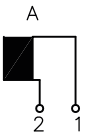
EV2S-CAN-G-...
EV2S-CAN-G18-...



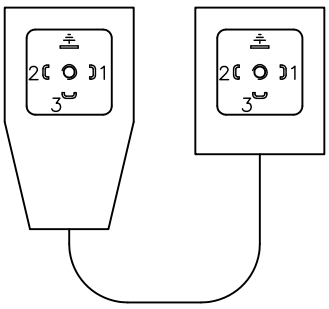
twin solenoid



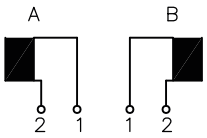
Single-action solenoid



EV2S-CAN-DG-L3K

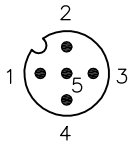


2 single-action solenoids



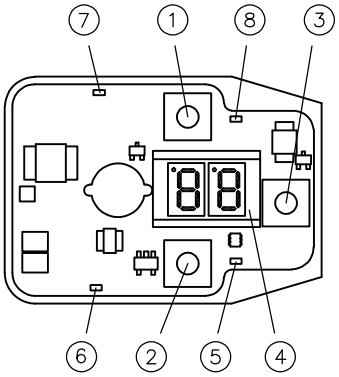
Layout plan

Signal	L3K	M	.. - M
	Litz wire number	M 12 pin	
U_B	1	1	
PGND / analogue input 1 GND	2	2	
Analogue input 1	3	3	
CAN-H / analogue input 2	4	4	
CAN-L / analogue input 2 GND	5	5	



5.2 Operating instructions

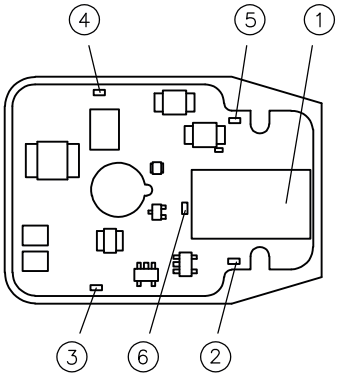
EV2S-CAN board



Layout plan

1 Button - UP
2 Button - DOWN
3 Button - OK / Back
4 Display
5 LED - Power (green)
6 LED - A-side (green)
7 LED - B-side (orange)
8 LED - Error (red)

EV2S-BT board



Layout plan

1 Bluetooth module
2 LED - Power (green)
3 LED - A-side (green)
4 LED - B-side (orange)
5 LED - Error (red)
6 LED - Bluetooth active (blue)

CAN communication

The proportional amplifier EV2S can be used in CAN networks according to CAN 2.0A with 11-bit identifier and CAN 2.0B with 29-bit identifier.

Target values sent by a master can be converted into a valve current. An analogue sensor can also be read and the values sent to the master via CAN bus.

The proportional amplifier type EV2S is delivered with the ID 126.

The baud rate can be freely selected between 10 and 1,000 kbit/s. The default value is 250 kbit/s.

Input

Input signals can be directly converted into control current at the output. As there are many different input signals and customer requirements, it is necessary to provide a description of the input signal and the subsequent action.

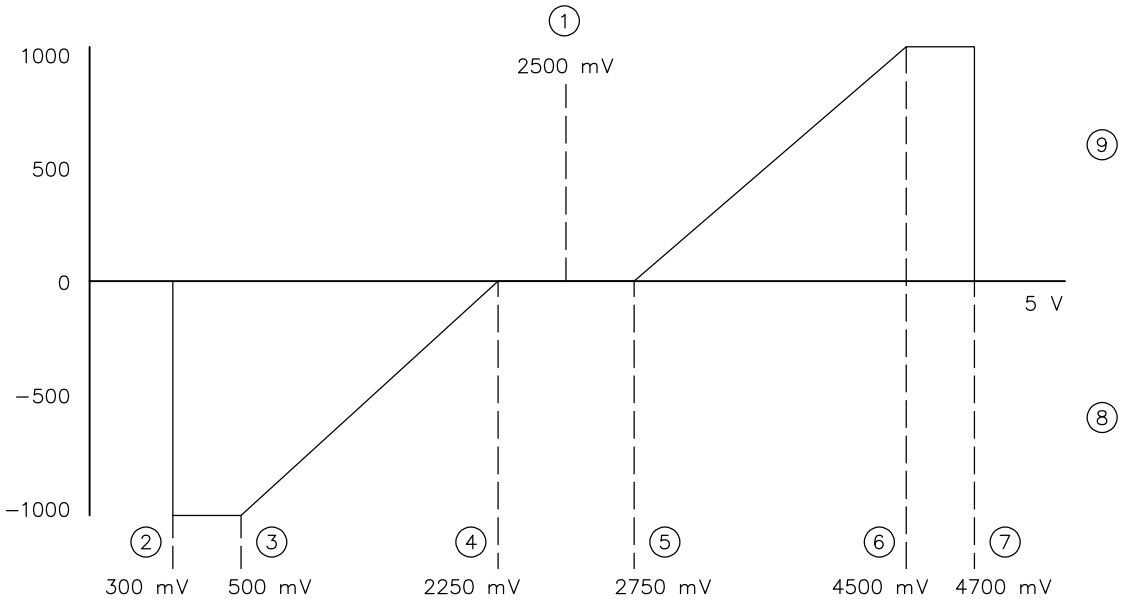
The way the proportional amplifier should behave with the relevant input signal is defined in the user parameters, using the device type.

Analogue input 1 measures the generated signal on a differential basis. Analogue input 2 is referenced to ground. If the input signal permits it, analogue input 1 must be used in order to create more immunity against interference.

If analogue input 2 is being used, connect it to analogue input 1 GND.

Circuit examples (see Chapter 6, "Circuit examples")

Example: 0.5 ... 4.5 V DC joystick // twin valve



1 Middle value
2 Error bottom
3 Maximum negative
4 Minimum negative
5 Minimum positive
6 Maximum positive
7 Error top
8 A-side
9 B-side

Display (type EV2S-CAN)

The two-digit seven-character display shows the abbreviation for the selected menu item or the value of the selected user parameter within the menu structure. Values ranging from -9,999 to +99,999 can be shown. User parameters with values ranging from 0 to 99 are shown directly in the character display. Values greater than 99 are shown individually in thousands, hundreds, tens and single unit blocks. The display is similar to a combination lock.

Each block of values is displayed by pressing **OK**, starting from the thousands. Pressing the **OK** button again in the single unit range switches to the thousands range.
The current block of values is shown by two dots in the display. At the top of the character display, the dots light up differently depending on the block of values.

The **negative numbers** are displayed as follows:
The symbol is only entered and displayed in the thousands position. To do this, the thousands position must be decreased to the value zero by pressing the **DOWN** button. The symbol is then changed by pressing and holding the **DOWN** button, if the value range permits this. The digit can be increased or decreased as usual by pressing the **UP** or **DOWN** button.

The **standby** function is displayed after successful initial commissioning. A dot then flashes slowly and continuously in the right display field. An **error code** is displayed in the event of an error. This enables troubleshooting to be carried out more quickly.

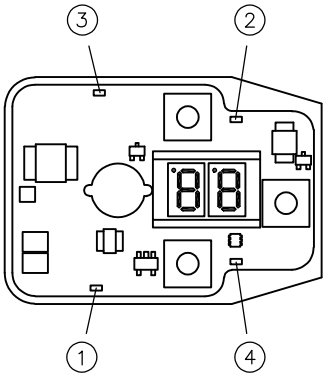
The table below shows how positive values are displayed using 12,438 as an example.

Values	Coding	Example	
1000 ... 99 000	Left and right dot	12 000	
100 ... 900	Left dot	400	
10 ... 90	Right dot	30	
1 ... 9	No dot	8	

The table below shows how negative values are displayed using -5678 as an example.

Values	Coding	Example	
-1000 ... -9000	Left and right dot	- 5000	
100 ... 900	Left dot	600	
10 ... 90	Right dot	70	
1 ... 9	No dot	8	

LED displays



Four LEDs are built into the board to enable simple status monitoring. If the LEDs light up one after another, this means the device firmware is damaged and needs to be reinstalled.

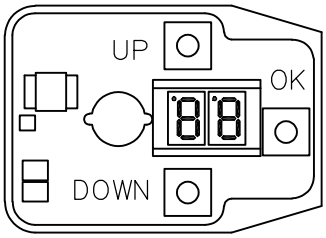
Item	Colour	Description
1	Green	**Solenoid output A, active:** Lights up when the output for the A-side is active
2	Red	**Error:** Lights up when an error is detected
3	Orange	**Solenoid output B, active:** Lights up when the output for the B-side is active
4	Green	**Power:** Lights up continuously when the device is correctly supplied with voltage

5.3 Instructions for adjustment with buttons (type EV2S)

The proportional amplifier is parametrised using three buttons and a two-digit seven-segment display. Key values can be selected, requested and modified via the menu items using the three buttons. The designation of the selected parameter and the current values are shown in the display.

NOTICE
In order to open the proportional amplifier cover without risk of damage, the M3 tapped plug must first be fully removed. Ensure the O-ring is correctly positioned during assembly.

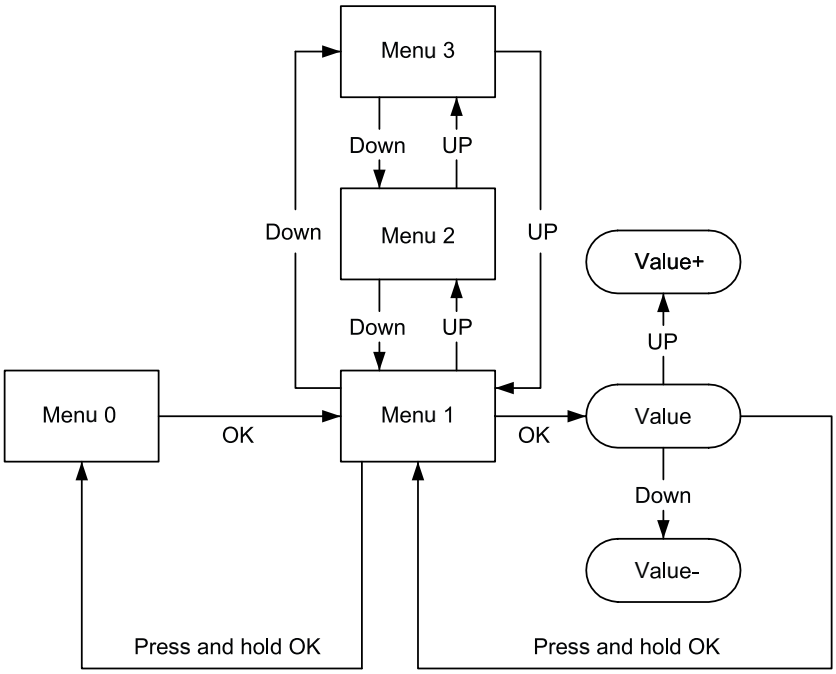
Navigation



Within a menu, the individual menu items are selected using the **UP** and **DOWN** buttons.
OK confirms the selection and takes you to the relevant submenu/user parameters.
In order to return to the higher-level menu, the **OK** button must be pressed until the new menu item is displayed.

The values of the user parameters are also changed using the **UP** and **DOWN** buttons. The value is increased/decreased by pressing the button once. Pressing and holding the button down automatically increases/decreases the value until the button is released. Modifications to the user parameter are immediately saved.

If there is no input after more than 120 seconds, the menu is exited.



Menu

Press any button to access **data** in the parameter menu. Press the **OK** button to navigate further into the menu structure (change from main menu to submenu 1).

Main menu and submenu 1

Main menu	Display	Submenu 1	Display
Configuration	C	Password	CP
		Reset	Cr
		CAN	Cc
		Device type	Cd
Input	A	**Input 2**	A2
		Input 1	A1
Output	P	**Output 2**	P2
		Output 1	P1
Data	d	Diagnostics	dI
		Product information	In
		Time	rt
		Supply voltage	Ub
		Temperature	tE

User parameters – data

Submenu 1	User parameters	Display	Value		Description
			Minimum	Maximum	
Diagnostics (dI)	Current target value	AS	Actual value display		Actual, calculated target value
	Current measured value 2	A2			Actual analogue value 2 in V/mA/%
	Current measured value 1	A1			Actual analogue value 1 in V/mA/%
	Part number	tn			HAWE part number
Product information (In)	Serial number	Sn	Actual value display		Serial number
	Software version	SO			Version number Software
	Hardware version	hA			Serial number Hardware
Time (rt)	Total runtime	rh	Actual value display		Runtime since initial commissioning in h
	Runtime	rr			Runtime since last reset in h/min/sec
	Supply voltage	Ub			Supply voltage in mV
	Temperature	tE			Temperature in °C

User parameters – output 1

User parameters	Display	Value		Description
		Minimum	Maximum	
Resistance 1	r 0	1	40	In Ω
Dither amplitude 1	d A	0	98	In %
Dither frequency 1	d F	0	16	According to dither frequency table
Dither type 1	d t	0 - 1		Superimposed with 1 kHz, PWM
Ramp, down 1	r d	0	30,000	1/100 sec
Ramp, up 1	r U	0	30,000	1/100 sec
Maximum current 1	I h	0	2,000	Maximum current at target value 100%
Minimum current 1	I L	0	1,000	Minimum current at target value 0.1%
Actual current 1	A c	Actual value display		Actual current at the valve in mA

User parameters – output 2

User parameters	Display	Value		Description
		Minimum	Maximum	
Resistance 2	r 0	1	40	In Ω
Dither amplitude 2	d A	0	98	In %
Dither frequency 2	d F	0	16	According to dither frequency table
Dither type 2	d t	0 - 1		Superimposed with 1 kHz, PWM
Ramp, down 2	r d	0	30,000	1/100 sec
Ramp, up 2	r U	0	30,000	1/100 sec
Maximum current 2	I h	0	2,000	Maximum current at target value 100%
Minimum current 2	I L	0	1,000	Minimum current at target value 0.1%
Actual current 2	A c	Actual value display		Actual current at the valve in mA

Dither frequency

Display	Frequency in Hz	Display	Frequency in Hz	Display	Frequency in Hz
0	50	**6**	71	**12**	125
1	52	**7**	76	**13**	142
2	55	**8**	83	**14**	166
3	58	**9**	90	**15**	200
4	62	**10**	100	**16**	250
5	66	**11**	111		

User parameters – input 1

User parameters	Display	Value		Description
		Minimum	Maximum	
Calculated positive 1	C P	-1,000	1,000	Scaling, target value B side, per mil
Calculated negative 1	C n	-1,000	1,000	Scaling, target value A side, per mil
Error above 1	E t			Upper error threshold
Maximum positive 1	A P			Target value for maximum deviation in the positive direction
Minimum positive 1	I P			Target value for initial deviation in the positive direction
Minimum negative 1	I n			Target value for initial deviation in the negative direction
Maximum negative 1	A n			Target value for maximum deviation in the negative direction
Error below 1	E b			Lower error threshold
Ramp negative, down 1	n d	0	30,000	In 1/100 sec
Ramp negative, up 1	n U	0	30,000	In 1/100 sec
Ramp positive, down 1	P d	0	30,000	In 1/100 sec
Ramp positive, up 1	P U	0	30,000	In 1/100 sec
Calculated value 1	C A	Actual value display -1,000	+1,000	Per mil
Raw value 1	r A	Actual value display		

User parameters – input 2

User parameters	Display	Value		Description
		Minimum	Maximum	
Calculated positive 2	C P	-1,000	1,000	Scaling, target value B side, per mil
Calculated negative 2	C n	-1,000	1,000	Scaling, target value A side, per mil
Error above 2	E t			Upper error threshold
Maximum positive 2	A P			Target value for maximum deviation in the positive direction
Minimum positive 2	I P			Target value for initial deviation in the positive direction
Minimum negative 2	I n			Target value for initial deviation in the negative direction
Maximum negative 2	A n			Target value for maximum deviation in the negative direction
Error below 2	E b			Lower error threshold
Ramp negative, down 2	n d	0	30,000	In 1/100 sec
Ramp negative, up 2	n U	0	30,000	In 1/100 sec
Ramp positive, down 2	P d	0	30,000	In 1/100 sec
Ramp positive, up 2	P U	0	30,000	In 1/100 sec
Calculated value 2	C A	Actual value display -1,000	+1,000	Per mil
Raw value 2	r A	Actual value display		

Configuration / CAN configuration

Submenu 1	User parameters	Display	Value		Description
			Minimum	Maximum	
	Password	C P	0	30,000	Password for locking the menu
	Reset	C r			Press the UP and DOWN buttons simultaneously to restore the delivery condition
CAN (Cc)	CAN ID	C I	1	127	CAN ID (Default 126)
	CAN baud rate	C b	10	1,000	CAN baud rate
	Device type	C d	0	15	Device type according to table

5.4 Initial operation (quick start)

Switch on device

1. Connect power supply (litz wire/pin 1 and litz wire/pin 2)
2. Switch on power supply
   ✓ Display on C –

Select number of solenoids

☑ Single-action, twin and 2 single-action solenoids can be selected.

3. Select number of solenoids.

Display	Description
C –	No selection, invalid input
C 1	One single-action solenoid
C 2	One twin solenoid or two single-action solenoids (only possible with EV2S-CAN-DG-L3K)

Select the operating mode using the **UP** and **DOWN** buttons.
Confirm the desired operating mode with **OK**

✓ Display on E –

Select input signal

☑ To ensure operation without problems, it is essential to define the input signal correctly

4. Select input signal

Display	Input signal	Port
E –	No selection, invalid input	
E 0	**0 to 10 V DC**	Analogue input 1
E 1	**4 to 20 mA**	Analogue input 1
E 2	**0 to 10 V DC**	Analogue input 2
E 3	**CAN**	Analogue input 2
E 4	**PWM**	Analogue input 1
E 5	**2x 0 to 10 V DC**	Analogue input 1 & 2
E 6	**-10 to +10 V DC**	Analogue input 2
E 7	**0.25 to 0.75 Ubat** ▪ **A:** 0.49 to 0.25 Ubat ▪ **B:** 0.51 to 0.75 Ubat	Analogue input 1
E 8	**0 to 5 V DC**	Analogue input 1
E 9	**0 to 5 V DC**	Analogue input 2

Select the operating mode using the **UP** and **DOWN** buttons.
Confirm the desired operating mode with **OK**

✓ Display on U –

Select supply voltage

5. Select supply voltage

Display	Description
U –	No selection, invalid input
12	12 V DC supply voltage
24	24 V DC supply voltage

Select the operating mode using the **UP** and **DOWN** buttons.
Confirm the desired operating mode with **OK**

✓ Display on P –

Select valve type

☑ Valve-specific settings, such as minimum current, maximum current, dither amplitude and dither frequency are crucial for ensuring that operation is as accurate as possible. Basic settings have been pre-defined for the most common valves

6. Select valve type

Display	Valve type	Minimum current	Maximum current	Dither amplitude	Dither frequency
P –	No selection, invalid input				
P 0	General	0.0 A (12 V DC) 0.0 A (24 V DC)	1.0 A (12 V DC) 0.5 A (24 V DC)	50%	100 Hz, PWM
P 1	PSL 2	0.34 A (12 V DC) 0.17 A (24 V DC)	1.16 A (12 V DC) 0.58 A (24 V DC)	50%	100 Hz, PWM
P 2	PSL 3 & 5	0.37 A (12 V DC) 0.18 A (24 V DC)	1.26 A (12 V DC) 0.63 A (24 V DC)	50%	100 Hz, PWM
P 3	EDL	0.46 A (12 V DC) 0.23 A (24 V DC)	1.56 A (12 V DC) 0.78 A (24 V DC)	50%	100 Hz, PWM
P 4	EMP..V PRL / PIL	0.4 A (12 V DC) 0.2 A (24 V DC)	1.6 A (12 V DC) 0.8 A (24 V DC)	50%	100 Hz, PWM
P 5	PMV	0.2 A (12 V DC) 0.1 A (24 V DC)	1.26 A (12 V DC) 0.63 A (24 V DC)	30%	100 Hz, PWM
P 6	PDV	0.2 A (12 V DC) 0.1 A (24 V DC)	1.2 A (12 V DC) 0.68 A (24 V DC)	30%	100 Hz, PWM
P 7	PDM	0.2 A (12 V DC) 0.1 A (24 V DC)	1.26 A (12 V DC) 0.63 A (24 V DC)	30%	100 Hz, PWM
P 8	SEH	0.18 A (12 V DC) 0.1 A (24 V DC)	1.26 A (12 V DC) 0.63 A (24 V DC)	30%	100 Hz, PWM

Select the operating mode using the **UP** and **DOWN** buttons.
Confirm the desired operating mode with **OK**

✓ The display shows the setting for the first selection point “operating mode”

7. Press the **OK** button to check the selected settings again
8. Press the **UP** and **DOWN** buttons simultaneously for 2 seconds to save the settings

✓ Ready for the next step: set the input signal and test the function

5.5 Instructions for setting up with software

- The proportional amplifier type EV2S can be parametrised using the HAWE Visual Tool parameterisation software via the CAN interface. A CAN-USB dongle from PEAK-SYSTEMS is required for this.
  PEAK USB-CAN driver for PEAK PCAN-USB CAN-interface

- The document "EV2S User Manual" describes the software and the setting options in detail.
  Manual - Proportional amplifier type EV2S-CAN

- EV2S - EDS file
  EV2S - EDS

NOTICE
Some file types open directly in the browser window by default. To download them, please right-click on the file names or file extension and then select “Save target as” or “Save link as”.

5.6 Error management

The error code display consists of two displays. Firstly, the text “Er” is displayed, then the display changes to the error number.

Code	Designation	Group	Comment
Er 10	Error Bottom	Input 1	Cable break detection triggered
Er 11	Error Top	Input 1	Short-circuit detection triggered
Er 12	Error Middle	Input 1	For twin valves: Before a target value is set, a “zero target value” (joy-stick middle position) must first exist.
Er 13	Overload current signal	Input 1	Current signal above 20 mA measured
Er 20	Error Bottom	Input 2	Cable break detection triggered
Er 21	Error Top	Input 2	Short-circuit detection triggered
Er 22	Error Middle	Input 2	For twin valves: Before a target value is set, a “zero target value” (joy-stick middle position) must first exist.
Er 30	Error Open	Output 1	Cable break detected
Er 31	Error Short	Output 1	Short-circuit detected; error can only be deleted using a reset or with a target value = 0%
Er 32	Error Range	Output 1	Target value cannot be reached. Connected valve coil resistance is too high, e.g. a 24 V valve coil is being used in the 12 V system.
Er 40	Error Open	Output 2	Cable break detected at output 2
Er 41	Error Short	Output 2	Short-circuit detected; error can only be deleted using a reset or with a target value = 0%
Er 42	Error Range	Output 2	Target value cannot be reached. Connected valve coil resistance is too high, e.g. a 24 V valve coil is being used in the 12 V system.
Er 55	Heartbeat missing	CAN bus	No cyclical CAN open heartbeat telegram received
Er 56	Setpoint missing	CAN bus	No cyclic target value received (cycle time <= 300 ms)
Er 57	Startup missing	CAN bus	Startup telegram has not been received
Er 58	Bus Warning	CAN bus	E.g. CAN bus lines not correctly connected
Er 59	Bus OFF	CAN bus	E.g. incorrect baud rate selected/terminating resistor not present
Er 60	Temperature Warning	Temperature	Internal temperature too high; target values reduced automatically
Er 61	Temperature Shutdown	Temperature	Internal temperature is above maximum limit: outputs are deactivated
Er 70	No valid type	Parameter	The selected device type is invalid.
Er 80	Supply voltage low	Other	Supply voltage too low < 8 V DC
Er 81	Supply voltage high	Other	Supply voltage too high > 32 V DC
Er 82	AI1 / AI2 high	Other	2x 0 to 10 V DC mode: target value > 0% at analogue input 1 and 2 simultaneously

5.7 Changing the device type

A device type is defined during initialisation of the proportional amplifier. The device type defines the response of the power outputs to input signals. The device type can be changed at a later point as described below:

1. Call up reset function using the menu items Configuration C - Reset Cr.
   ✓ Display shows 00.
2. Press and hold the UP and DOWN buttons simultaneously.
   ✓ Reset confirmation: Display shows – –.
3. Remove the power supply for at least 5 seconds.
4. Restore the power supply.

Changing the device type via the menu

The device type can be changed using the menu items Configuration C - Device type Cd.

- The input signal configurations are reset to the delivery condition. ← ATTENTION!
- Any input parameters that have been changed will be overwritten. ← ATTENTION!
- Do not change the parameters for the power outputs or communication.
- The device type is defined using the table of device types.

Device types

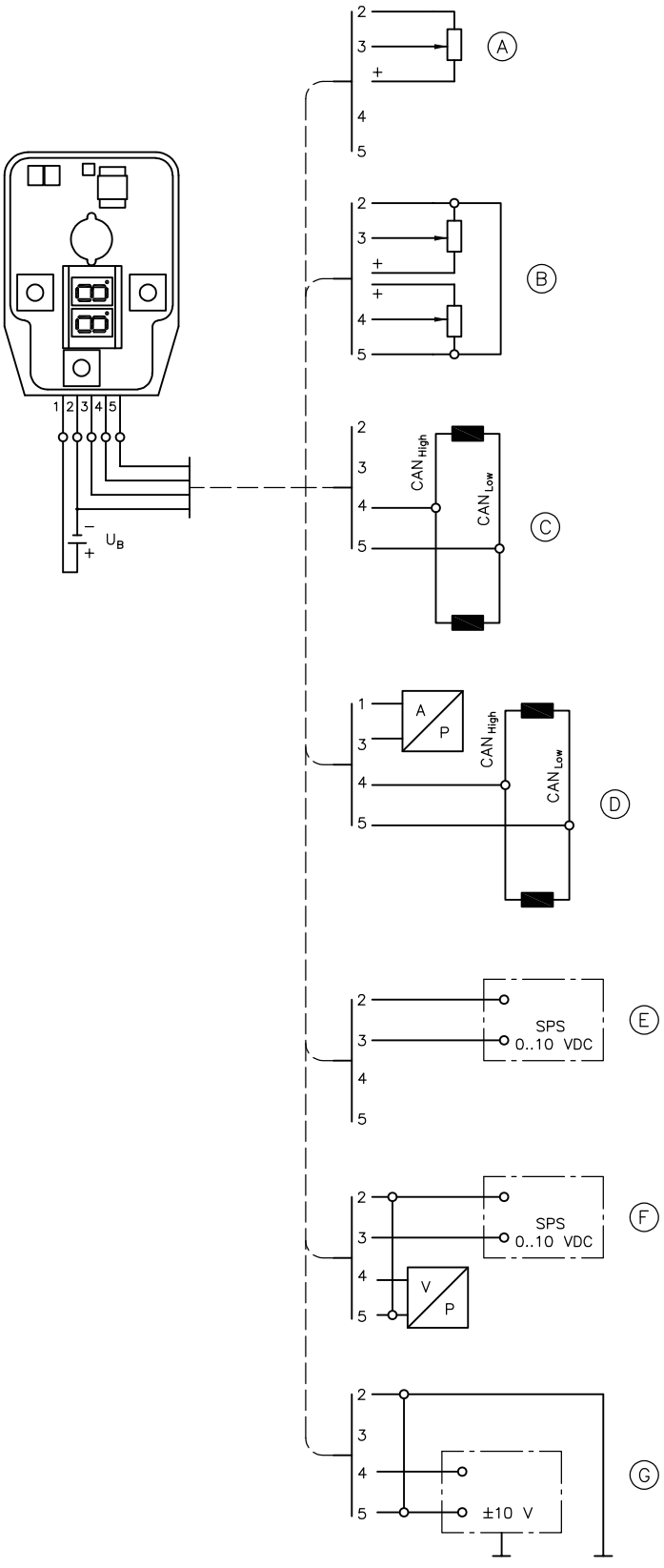
Device type	Input signal	Input	Solenoid type
1	0 - 10 V	Analogue input 1	Single solenoid
2	4 - 20 mA	Analogue input 1	Single solenoid
3	0 - 10 V	Analogue input 2	Single solenoid
4	2 x 0 to 10 V	Analogue input 1 and 2	Twin solenoid
5	± 10 V	Analogue input 2	Twin solenoid
6	Ratiometric to U_B	Analogue input 1	Twin solenoid
7	4 - 20 mA	Analogue input 1	Twin solenoid
8	0 - 10 V	Analogue input 1	Twin solenoid
9	0 - 5 V	Analogue input 1	Twin solenoid
10	CAN	CAN L/CAN H	Single/twin solenoid
11	0 - 10 V	Analogue input 2	Twin solenoid
12	0 - 5 V	Analogue input 2	Twin solenoid
13	PWM	Analogue input 1	Single solenoid
14	PWM	Analogue input 1	Twin solenoid
15	0 - 5 V	Analogue input 1	Single solenoid
16	0 - 5 V	Analogue input 2	Single solenoid
17	Ratiometric to U_B	Analogue input 1	Single solenoid
18	± 10 V	Analogue input 2	Single solenoid
19	2 x 0 to 10 V	Analogue input 1 and 2	Single solenoid

Changing the device type with the HAWE Visual Tool

- The device type is stored in parameter 18.
- The device types are described in the table of device types.

6 Circuit examples

6.1 Circuit example



Example A Operation with an external target value potentiometer at analogue input 1, using an external power supply for the target value potentiometer

Example B Operation with two external target value potentiometers at analogue input 1 and 2, using an external power supply for the target value potentiometer

Example C Operation in the CAN bus network

Example D Operation in the CAN bus network and reading of a sensor (possible signals see Chapter 3.3, "Electrical data")

Example E Operation with an external target value source from PLC, CNC or computer

Example F Operation with an external target value source from PLC, CNC or computer and control using analogue sensor (closed-loop control circuit; programming in eDesign or C required)

Example G Operation with an external target value source from PLC, CNC or computer at analogue II

6.2 Initial commissioning kit

General information

Designation	Initial commissioning kit
Connection	▪ Europlug type C ▪ M12, 5-pole ▪ Single-wire terminals, max. 2.5 mm² ▪ D-Sub plug DE-9
Weight	≈ 190 g
Protection class	IP 20

Electrical data

Supply voltage	100 ... 240 V AC, 50 to 60 Hz
output voltage	24 V DC
Output current	max. 1 A
CAN termination	120 Ω terminal resistor integrated in D-Sub plug

Layout plan

Signal	Single-wire terminal	M 12 pin	D-Sub pin
U_B	Red	1	--
PGND/analogue input 1 GND	Black	2	--
Analogue input 1	White	3	--
CAN-H/analogue input 2	Green	4	2
CAN-L/analogue input 2 GND	Yellow	5	7

⚠ **CAUTION**

Risk of injury from electric shock if voltage is applied to the terminals.

Minor injury or burning

- Only have work performed on the electrical system by an electrically skilled person or by trained personnel working under the supervision of an electrically skilled person.
- Please note that incorrect assembly of electric cabling may result in material damage.

References

Additional versions

- Proportional amplifier type EV1D: D 7831 D
- Proportional amplifier type EV1M3: D 7831/2
- Proportional amplifier type EV22K5: D 7817/2
- Ventilsteuerung Typ CAN-IO 14+: D 7845-IO 14

Application

- Proportional directional spool valves types PSL, PSV size 2: D 7700-2
- Proportional directional spool valves types PSL/PSV/PSM, size 3: D 7700-3
- Proportional directional spool valve, type PSL, PSM and PSV size 5: D 7700-5
- Proportional directional spool valve banks type PSLF and PSVF size 7: D 7700-7F
- Proportional directional spool valve type EDL: D 8086
- Proportional pressure-limiting valve type PDV and PDM: D 7486
- Directional seated valve type EM and EMP: D 7490/1
- Directional spool valve type NSWP 2: D 7451 N
- Variable displacement axial piston pump type V60N: D 7960 N
- Variable displacement axial piston pump type V30D: D 7960
- Variable displacement axial piston pump type V30E: D 7960 E
- Proportional flow control valve type SE and SEH: D 7557/1

D 7818/1 12-2023-2.5

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