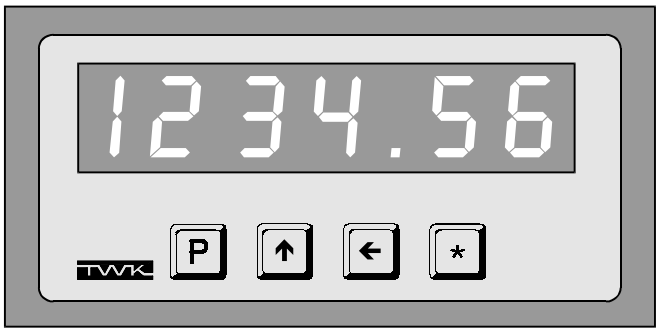

User's manual

TWK- ELEKTRONIK GMBH · D - 40041 DÜSSELDORF · PF. 105063 · HEINRICHSTR. 85 · TEL. 0211/632067 · FAX 0211/637705

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1. General

The postion display PAS 96A is an electronic device to visualise a position detected by an absolute encoder. The data transfer between display and encoder is done by an SSI-interface.

Features:

- Programmable parameters to adapt the display to individual requirements of different application
- Programming of all parameters via keys on the front side
- Programmable chain funktion
- Store of all parametesr in a non-volantile memory E²PROM
- Option: serial Interface RS 232
  serial Interface RS 485

2. Remarks to savety

1. Please read this documentation and follow all advices befor conneting this device to mains supply. This is for your savety and the savety of the device

2. Never use the device and the system under conditions out of specification. Reffer to data sheet, user's manual and label on the device.

3. Take care tha the voltages are not exeeded

4. All wiring must be carried out when the device is not connected to mains supply. When mains is supplied to the device no wiring works must be carried out.

5. Do not open the device in case of failure. Do not try to repair or maintain the device. Defective devices shall be send to TWK-ELEKTRONIK GmbH for repairment or maintainance.

3. Remarks to noise immunity

To archive a high noise immunity and low electronic radiation the following means shall be carried out:

- Use shilded cable (diameter of shilding min. 4 mm²).
- The connection of ground and shilding shall be on one central point using large area.
- The diameter of connection cables shall be min. 0.14 mm² .
- Avoid parallel lines with power supply line to minimise cross talk.
- For differential signals like RS 485 / RS 422 use twisted pair cables.

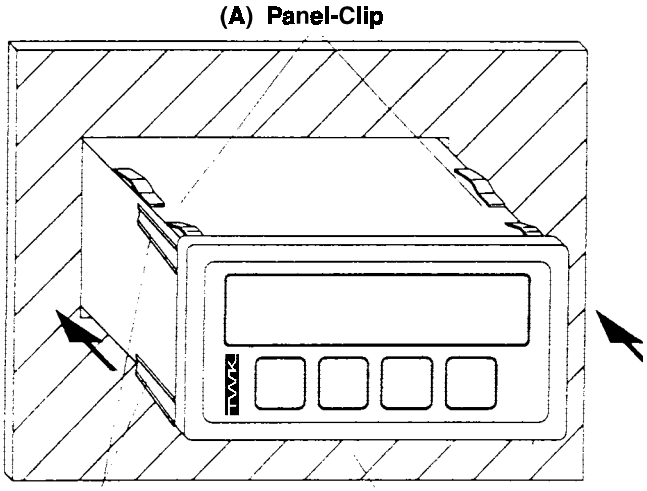
- It is recommeded to connect the shilding on both sides if there are no disturbances due to loop effect or strong current via the shilding.

4. Mounting of the display

The mounting must be in accordance with the protection grade of the display. Thus additional protection against heat, dust, water may be required (reffer to the technical data)

The display can be mounted to a panel according to DIN 43700.

Mounting :
Put the display from the front side into the panel (C) untill the panel clips (A) slot in and fix the device. Then the black fixing parts (B) are to be put in.



5. Getting stared

Switch on the power supply

1. All segments are alluminated for 1.5 s to show they are working
2. Display of software version
3. Display of actual position value

Now the device can be programmed

6. Programming

6.1 Opperation modes

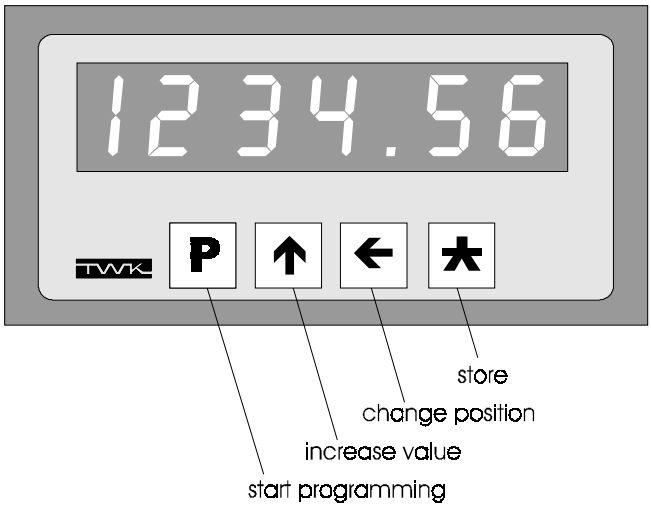
Two modes are available to change the displayed values via the keyboard:

Programming mode: Programming according to the application

Entry mode: Functionen that are used during opperation

6.2 Function of keys

Using the four foil-keys on the front side of the device the display is programmde and controlled.
Depending on the mode the keys can change their function.



6.3 Programming mode

To change the programming and the parameters the device is to be set to the programming mode.

Function:

Enter programming:	Push the Programming key for 10 seconds [P]
Stop programming:	1. do not push any key for 30 seconds 2. push the programming key to the end of the parameter list
Next parameter:	Push programming key [P]
Change parameter:	use the keys [↑] [←] (entry is not stored automatcly)
Store the changes:	use the key [*]

6.3.1 Programming Parameter

Parameter	Display		Range of value	
	German	English	German	English
Display value per rotation	A-S-U	d-P-t	0 ... 59999	
Display divisor	dI	dI	1,10,100,1000	
Codesense	C-S	C-S	c-CW,	cc-CCW
decimal Point	dP	dP	0., 0.0, 0.00, 0.000, 0.0000	
Enable reset via key	F-SEt	E-SEt	EIn, AUS	En, dIS
Enable chain function	F-rEL	E-rEL	EIn, AUS	En, dIS
Enable update of calibration	F-CAL	E-CAL	EIn, AUS	En, dIS
Enable update of offset	F-OFF	E-OFF	EIn, AUS	En, dIS
Data Format	d-For	d-For	no, tAnnE	no, trEE
No of bits from encoder total	G-bit	t-bit	0 ... 29	
No of bits for single turn	S-bit	S-bit	0 ... 19	
Output Code	out-C	out-C	GrAY, bin	
Zerosetting of encoder	SEt	SEt		
Position value without calculation	dAtA	dAtA		
Baudrate	bAUd	bAUd	300, 600, 1200, 2400, 4800, 9600, 19200	
Lenguage	SPr	LAn	dEUt,EnGL	GEr,EnGL
Internal code for updates	CodE	CodE	keine Anwenderfunktion	

6.3.2 Description of parameters

Parameter	Display	Description
Display value per rotation	A-S-U	displayed value after one rotation of the encoder
Display divisor	dI	Divisor for the reduction of the resolution
Code sense	C-S	Which direction of rotation yields increasing values c = CW (clockwise) cc = CCW (counter clockwise)
decimal Point	dP	adjustable range 0.0000 to 00000. (none)
Enable reset via key	E-SEt	with the key * the display can be resetted AUS: reset disabled EIn: reset enabled

6.2 Description of parameters

Parameter	Display	Description
Enable chain function	E-rEL	Change between absolut value and reset with related measurement diS: chain function disabled En: chain function enabled
Enable Calibration	E-CAL	Allowing for change in calibration diS: calibration disabled En: calibration enabled
Enable offset change	E-OFF	Allowing for change in offset value diS: change in offset disabled En: change in offset enabled
Data format	d-For	**no -** The position values will be expected to be transmitted without leading / trailing zeros. **trEE-** The position values will be expected to be transmitted with leading / trailing zeros. (25-bit-protokoll (12 bit Multitour, 13 Bit-single-tour), reffer to SSI-protocoll).
total no of bit	t-bit	**Example:** total no of bit = 22 Multitour part: 4096 rotation = 2^{12} Singletour part: 1024 steps/rotation = 2^{10}
no of bit in single turn	S-bit	see above
Output code	out-C	Code from encoder **gray** or **binary**.
Reset to encoder	SEt	Resetting the encoder during programming
Position value of encoder	dAtA	Display of value directly from encoder with out calculation
Baud rate	bAUd	Entry of baud rate for serial interface RS 232. MODE COMx:Baud, Parity ,Datenbits, Stopbits, Retry. (300, 600, 1200, 2400, 4800, 9600, 19200)
Lenguage	LAn	Display of menu points with German or English abreviation: ☐ German ☐ English
internal	CodE	no external function

6.4 Entry modes

6.4.1 Reset function (setting to calibration and offset value)

Conditions: 1.) the reset function must be enabled (parameter E-SEt must be set on EN)
2.) the device is in run - mode (not in programming - mode)

Push the key [*]

6.4.2 Chain function

Conditions: 1.) the chain function must be enabled (parameter E-rEL must be set on EN)
2.) the device is in run - mode (not in programming - mode)

Push both keys [↑] [←] to activate the chain function
When both keys are pushed the display sets to zero and the decimal point starts flashing to indicate the chain function is activated.

Deactivate the chain function by pressing both keys again. The display jumps back to the absolute value.

6.4.3 Change in calibration and offset value

Conditions: 1.) the function must be enabled (parameter E-CAL / E-OFF must be set on EN)
2.) the device is in run - mode (not in programming - mode)

Push both keys [P] [↑] to activate the calibration function (E-CAL)
Push both keys [P] [←] to activate the offset function (E-OFF)

The display shows the calibration / offset value. The value can be changed using the arrow keys.

When the new value is entered press [*] to confirm and store.

EXIT : The mode can be left by waiting for 30 s or by pushing [P]

6.4.4 Description of parameter CAL, OFF

Bezeichnung	**Anzeige**	**Beschreibung**
Calibration value	CAL	Refference point for measurement.
Offset value (adder)	OFF	Adder for calibration-reset

7. Calibration

When calibrating the programmed calibration value plus offset value are displaye. If both are zero (or their total) the display shows zero.

The calibration can be carried out by:

1. Hardware connect the CAL input to groung (reffer to the connecting diagram)

2. Push the key [*] (parameter E-CAL needs to be enabled)

8. Errorhandling

Display	Error	Recommendation
FuLL	overflow	Programmed values need to be changed
tot		No response from encoder:check the connection
Display 00000 flashing	low supply voltage	check the power supply

9. RS 232 command listing - standard protokoll

The RS 232 standard mode is used for testing the display during production. The display can be connected to a PC. The interface must have the following settings:

4800 Baud, no Parity, 8 Bit, 1 Stopbit, no Handshake.

The transfer works so that the PC transmit a capital letter to the display. The display answeres (ASCII-character) and <CR> (13 h).

Command	Lenghts	Answer	Description
Ax	2/7	xxxxxxx>	Software version x = 0: Hardware version x = 1: Software version x = 2: Device type
B	1/9	±xxxxxxx>	Binary sition value
Ey	2/9	±xxxxxxx>	3-Byte value (output) y = Address (1...5) xxxxxxx = decimal value y = 1: Position value y = 2: Calibration value y = 3: Offset value y = 4: Chain value (related value) y = 5: SSI-zero setting
Fy±xxxxxx	9/1	>	3-Byte-value (enter) y = Address (2...4) xxxxxxx = decimal value y = 2: Calibration value y = 3: Offset value y = 4: Chain value (related value) y = 5: SSI-zero settingt
Gy	2/6	xxxxx>	2-Byte- value (output) y = Address (0...7) xxxxx = decimal value y = 0: Anzeigewert pro Umdrehung A-S-U y = 1: y = 2: Decimal point dP y = 3: Baudrate bAUd y = 4: total No of bit of encoder (t-bit) y = 5: No of bit for single tour part (S-bit) y = 7: Display divisor dI

Command	Lenghts	Answer	Description
Hy_xxxxx	8/1	>	2-Byte-value (enter) y = Address (0...5) xxxxx = decimal value y = 0: display value per rotation d-P-t y = 1: y = 2: decimal point dP y = 4: total No of bit of encoder (t-bit) y = 5: No of bit for single tour part (S-bit)
Iabcd	5/1	>	Enable Frontkeys a: reset b: chain measurement c: entry of calibration value d: entry of offset value (0 = off, 1 = on)
K		1/0	Software - RESET
Mabc	4/1	>	SSI-Format entry a: Format (0=non, 1= Tree) b: output (0=gray, 1=binary) c:
N		1/1	xxyyzz output flag_register xx: flag_register _3 (HEX) yy: flag_register_2 (HEX) zz: flag_register (HEX)
S		1/1	> put device to standard
Tx	2/1	>	Code sense of encoder x=0: CW x=1: CCW
W	1/3	xyz	Position value binary xyz= 3 Byte in 2-th Complement MSB ... LSB
Xxyyy	5/1	>	Test of display x: Digit number (0 ... 5, >5= Test off) yyy: ASCII-Number of character
Yx	2/1	>	enter divisor x=0: dI=1 x=1: dI=10 x=2: dI=100 x=3: dI=1000
Z	1/9	±xxxxxxx>	output position value

10. Demo software TWKTERM

The Demonstration software **TWKTERM** is an example for the conversion of the comand list.

It is selfexplaining
It will be activated by File TWKTERM.EXE. (Files: TWKTERM.EXE, TWKTERM.CNF).
The setup is done by [ALT-S] (COM-Initialisierung u. a.)
Help is by [ALT-H]

11. Documentation

- ☐ Data sheet PAS 96A: PAS 10610
- ☐ Connection : TZY 10608
  Programmable Position Display PAS 96A
- ☐ Demonstration software: TWKTERM - 3,5" Diskette

Furthermore the documentation of the encoder is required

- Anschlußklemme 2x13 polig/*Plug-in screw terminal, 2x13 poles:* PAS 96A
- Arbeitstemperaturbereich/ *Operating temperature range*: 0° C ... + 50° C

Kontakt-Nr *Pin No*	Belegt mit... / *connected to ...*	
1	$+U_{ENC}$ = ca. 20 VDC Winkelcodiererversorgung max. 200 mA	*$+V_{ENC}$ = ca. 20 VDC* *Encoder supply voltage* *max. 200 mA*
2	Takt + SSI	*Clock + SSI*
3	Daten + SSI	*Data + SSI*
4	Kontakt nicht belegt	*Pin not connected*
5	$-U_{ENC}$ = 0 VDC Winkelcodiererversorgung (Schirmanschluß für Winkelcodierer)	*$-V_{ENC}$ = 0 VDC* *Encoder supply voltage* *(Connection for screened line of the encoder)*
6	Kontakt nicht belegt	*Pin not connected*
7	Kalibrierschaltereingang CAL	*Calibration switch input CAL*
8	Kontakt nicht belegt	*Pin not connected*
9	Kalibrierschaltereingang GND	*Calibration switch input GND*
10	Kontakt nicht belegt	*Pin not connected*
11	PE - Schutzleiter	*PE - Conductor (nonfused earthed conductor)* *Supply voltage*
12	N - Leiter (230, 110, 24 VAC); - U_B= 0 V (24 VDC)	*N - Conductor Supply voltage* *(230, 110, 24 VAC); - V_S = 0 V (24 VDC)*
13	L - Leiter [1)] (230, 110, 24 VAC); + U_B(24VDC)	*L - Conductor [1)] Supply voltage* *(230, 110, 24 VAC); + V_S (24VDC)*
14	Kontakt nicht belegt	*Pin not connected*
15	Takt - SSI	*Clock - SSI*
16	Daten - SSI	*Data - SSI*
17, 18	Kontakte nicht belegt	*Pins not connected*
19	GND RS 232/ RS 485	*GND RS 232/ RS 485*
20, 21	Kontakte nicht belegt	*Pins not connected*
22	TxD - RS 232 A - RS 485	*TxD - RS 232* *A - RS 485*
23	RxD - RS 232 B - RS 485	*RxD - RS 232* *B - RS 485*
24	PE - Schutzleiter	*PE - Conductor (nonfused earthed conductor)*
25, 26	Kontakte nicht belegt	*Pins not connected*

[1)] Spannungsversorgung / *Supply voltage* : 230 VAC (- 10 % ... + 6 %) / 50/60 Hz oder 110/24 VAC (- 15 % ... + 10 %) / 50/60 Hz oder 24 VDC (- 20 % ... + 20 %) .
Leistungsaufnahme / *Power consumption* < 9VA (ohne Winkelcodierer / *without encoder*)

- Belegung Verbindungskabel PAS 96A - PC (RS 232 - COMx) / *Connector arrangement PAS 96A - PC (RS 232 - COMx)*

Anschlußklemme 2x13 polig /PAS 96A / *Plug-in screw terminal, 2x13 poles / PAS 96A*

Sub-D9-Stecker (Buchse) zum PC-Anschluß RS 232/ *Sub-D9-Connector (Socket) to PC RS 232*

Kontakt-Nr *Pin No*	Belegt mit... / *connected to ...*	Kontakt-Nr *Pin No*
19	GND RS 232/*GND RS 232*	Pin 5
22	TxD - RS 232/*TxD - RS 232*	Pin 2
23	RxD - RS 232/*RxD - RS 232*	Pin 3
		Pins 1, 4, 6 - 9 nicht belegt/ *not connected*