

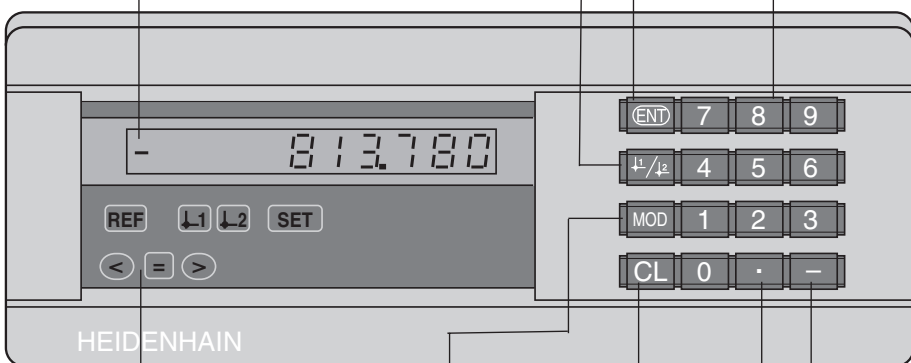
Actual value and input display

(7-segment LED, 9 decades and sign)

- **Select datum**
- Page backward in parameter list

- **Confirm entry value**
- Set display to value from P79 (P80!)

Numeric keypad



Status display

- **Output measured value over data interface (P86!)**
- Go to parameter list after switch-on
- Page forward in parameter list

- **Clear entry**
- Reset to zero (P80!)
- CL plus MOD: parameter list
- CL plus 2-digit number: select parameter
- Clear parameter entry and show parameter number
- **Algebraic sign**
- Decrease parameter value
- **Decimal point**
- Increase parameter value

Indicator	Meaning
REF	If decimal points are blinking: Display is waiting for the reference mark to be crossed over. If decimal points are not blinking: Reference mark was crossed over – datum points are now stored in nonvolatile memory. Blinking: Waiting for operator to press ENT or CL.
↓ 1 / ↓ 2	Datum 1 / Datum 2 currently active.
SET	Blinking: Waiting for operator to confirm entry values.
< / = / >	Sorting mode: Measured value less than lower limit / within tolerance / greater than upper limit.

The ND 261 is designed for use with HEIDENHAIN **angle encoders** with sinusoidal output signals: either ND 261 A for **11 μ App** (Id. Nr. 283 482 ..) or ND 261 V for **1 Vpp** (Id. Nr. 322 352 ..). These angle encoders have one reference mark or several *distance-coded* reference marks.

When a reference mark is crossed over, it generates a signal identifying that position as a reference point. After switch-on, simply crossing over a reference mark restores the relationship between axis positions and display values as it was last defined by datum setting.

With distance-coded reference marks, a maximum traverse of only 10° or 20° suffices to restore the datum.

Switch-On



Ent...CL

Turn on the power (switch located on rear panel).

- Display shows
- REF blinks.



5 , 6 9 7

Switch on reference mark evaluation

- Display shows the value last assigned to the reference mark position.
- REF indicator glows.
- Decimal point blinks.

Cross over reference mark

Move the axis until the display becomes active and the decimal point no longer blinks.

If you do **not** wish reference mark evaluation, press **CL** instead of ENT.

Setting the Datum

The datum setting procedure assigns a display value to a specific axis position. The ND 261 allows you to set two separate datum points.



Select datum 1 or 2.



4 0

Enter a value, such as 40.



Confirm entered value.

You can switch from one datum to the other at any time. Use datum 2 when you want to display incremental dimensions.

Sorting and Tolerance Check Mode

In this mode, the display value is compared with an upper and a lower limit value. Status indicators and the trigger signal outputs at the D-sub EXT connection (see that section) indicate whether the display value is less than the lower limit, greater than the upper limit, or between the two limit values.

Indicator	Meaning
=	Measured value is between the limit values
<	Measured value is less than the lower limit value
>	Measured value is greater than the upper limit value

Operating parameters for the sorting mode:

- P17: Sorting on/off
- P18, P19: Limit values

Data Output

There are three ways to output data:

- PRINT function: Press the MOD key (this method can be inhibited with operating parameter P86); **or**
- Input the command STX (CTRL B) over the RXD input; **or**
- Input a latch command over the D-sub connection EXT.

A **connecting cable** (to a PC, for example) is available from HEIDENHAIN (Id.-Nr. 274 545 ..); cable length up to 20 m (66 ft).

Operating parameters for data output: P50, P51

Wiring and pin layout

Connecting cable is either **completely** wired (left) or only **partially** wired (right).



CHASSIS GND: Chassis Ground; **TXD:** Transmitted Data, **RXD:** Received Data, **RTS:** Request To Send, **CTS:** Clear To Send; **DSR:** Data Set Ready; **SIGNAL GND:** Signal Ground; **DTR:** Data Terminal Ready

Signals	Signal level "active"	Signal level "not active"
TXD, RXD	-3 V to -15 V	+3 V to +15 V
RTS, CTS, DSR, DTR	+3 V to +15 V	-3 V to -15 V

Data transfer format and control characters

Format	ASCII code
Data word	1 start bit, 7 data bits, parity bit (even parity), 2 stop bits
Control characters	Call measured value: STX (CTRL B), interrupt DC3 (CTRL S), resume DC1 (CTRL Q) Enquire error message: ENQ (CTRL E)
Sequence	<ul style="list-style-type: none"> • Sign • Numerical value with up to 2 decimal points • Blank space (or ? for error) • Comparison result (<, >, =; ? if P18 > P19) or blank space • 1 blank space • Carriage return • Line feed

Storage and transfer times

The duration of data transfer depends on the selected baud rate and the number of additional line feeds. Display of degrees, minutes and seconds increases the storage and transfer times.

Latch signal	STX (CTRL B)	EXT (pulse)	EXT (contact)	PRINT
Storage time	≤ 1 ms	≤ 1 μs	≤ 5 ms	≤ 42 ms
Transfer time	≤ 44 ms	≤ 44 ms	≤ 48 ms	≤ 85 ms

D-Sub Connection EXT



Danger to internal components!

Voltage sources from external circuitry must conform to the recommendations in EN 50178 for low-voltage electrical separation. Connect inductive loads only with a quenching diode parallel to the inductance.



Use only shielded cable!

Connect the shield to the connector housing.

	Pin	Function	Pin	Function
Outputs	15	Meas. value \geq trigger limit A1 (P62)	1	0 V
	16	Meas. value \geq trigger limit A2 (P63)	10	0 V
	17	Meas. value $<$ lower sorting limit (P18)	5	Do not use
	18	Meas. value $>$ upper sorting limit (P19)	6	Do not use
	19	Error (see "Error Messages")	7	Do not use
Inputs	14	Display value is zero	8	Do not use
	2	Reset display to zero, clear error message	9	Do not use
	3	Preset display to value from P79	12	Do not use
	25	Cross over reference marks	13	Do not use
	4	Ignore reference mark signal	24	Do not use
	22	Pulse: output the measured value	11	Vacant
	23	Contact: output the measured value	20	Vacant
			21	Vacant

Signal levels	LOW		HIGH	
Inputs	$-0.5 \text{ V} \leq U \leq 0.9 \text{ V}$	$I \leq 6 \text{ mA}$	$3.9 \text{ V} \leq U \leq 15 \text{ V}$	
Outputs	$U \leq 0.4 \text{ V}$	$I \leq 100 \text{ mA}$	$U \leq 32 \text{ V}$	$I \leq 10 \mu\text{A}$

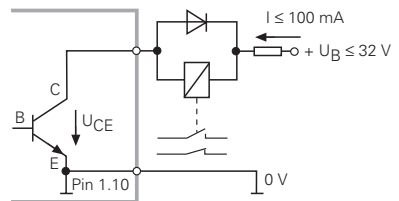
Description of input and output signals

Input signals

- Internal pull-up resistor 1 k Ω
- Triggering by make contact against 0 V **or** LOW level over TTL component
- Delay for Zero reset/Preset: $t_d \leq 2 \text{ ms}$
- Minimum pulse duration for all signals: $t_{\min} \geq 42 \text{ ms}$

Output signals

- Open collector outputs, active LOW
- Signal output delay: $t_d \leq 42 \text{ ms}$
- Zero crossover signal minimum duration, trigger outputs A1, A2: $t_0 \geq 180 \text{ ms}$



Note that these times will increase if features are active (such as the sorting mode) or if the measured values are being displayed in degrees/minutes/seconds.

Display Freeze by Measured Value Output Signal

The effect of the signal for measured value output on the display is defined in user parameter P23.

- **Concurrent display:** No display freeze. The unit shows the current measured value (*ACTL*).
- **Frozen display:** The display is frozen and is updated with each signal for measured value output (*HOLD*).
- **Frozen/concurrent display:** The display freezes only as long as the signal is present (*STOP*).

Error Messages

To clear error message *ERROR*

When you have removed the cause of the error,

- press CL.

Message	Cause and effect
<i>ERROR 01</i>	Last measured value not yet latched ¹⁾
<i>ERROR 02</i>	External device not ready for data transfer ¹⁾ (<i>ERROR 02</i> only appears once)
<i>ERROR 03</i>	Data interface: Parity error or wrong format ¹⁾
<i>ERROR 10</i>	Incorrect input value
<i>ERROR 11</i>	Overflow caused by external preset
<i>ERROR 13</i>	Overflow, trigger limit 1
<i>ERROR 14</i>	Overflow, trigger limit 2
<i>ERROR 15</i>	Overflow, lower sorting limit
<i>ERROR 16</i>	Overflow, upper sorting limit
<i>ERROR 50</i>	Encoder signal too weak ¹⁾ (encoder may be contaminated)
<i>ERROR 51</i>	Input frequency too high for encoder input ¹⁾ (will occur for example when traverse speed too high)
<i>ERROR 53</i>	Internal counter overflow
<i>ERROR 55</i>	Error while crossing over reference marks ¹⁾
<i>ERROR 80</i>	To clear the error message: Switch off the display unit.
<i>ERROR 83</i>	Should any of these error codes recur, contact your HEIDENHAIN service agency
<i>ERROR 84</i>	
<i>ERROR 86</i>	
<i>ERROR 94</i>	Offset compensation values for encoder signals have been erased: contact your HEIDENHAIN service agency.
<i>ERROR 99</i>	Erase the operating parameters.

If **all decimal points light up**, the measured value is too large or too small. In this case, set a new datum **or** retract.

If **all sorting indicators light up**, this means that the upper sorting limit is less than the lower limit.

¹⁾ These errors are significant for a connected device. The error signal (pin 19) at the EXT D-sub connection is active.

Operating Parameters

The parameters are divided into "user parameters" and "protected operating parameters," which can only be accessed by entering a code number.

User parameters

User parameters are operating parameters that you can change **without** entering the code number: They are designated P00 to P30, P50, P51, P79, P86

Calling user parameters

To call user parameters **immediately after switch-on**:

- Press the MOD key as long as `ENT. .CL` is visible in the display.

To call user parameters **during operation**:

- Press and hold the CL key, then press MOD.

To go **directly** to a specific user parameter:

- Press and hold the CL key, then press the first digit of the parameter number.
- Release both keys and press the second digit.

Protected operating parameters

Before you can change protected operating parameters you must enter the **code number 95 148** through `P00 CODE` : They **remain** accessible until you switch off the position display.

To page through the parameter list

- **Forward** paging: Press the MOD key.
- **Backward** paging: Press the \uparrow 1 / \downarrow 2 key.
By paging on, you automatically enter any change you've made in a parameter.

To change operating parameters

- Increase the parameter value with the decimal point key, **or**
- Decrease the parameter value with the minus key, **or**
- Enter the numerical value for the operating parameter, e.g. for P79 (`SET` blinks).

To correct your entries and show the parameter designation

- Press the CL key.

To exit the operating parameters

- Press ENT. All changes made become effective.

Operating Parameter List

Parameter	Meaning	Function / Effect	Setting
<code>P00 CODE</code>	Enter code number 95 148 to change a protected operating parameter.		
<code>P08 dISP</code> <i>Display</i>	Display mode	Decimal degrees Degrees, minutes, seconds	<i>DECIMAL</i> <i>DECMINSEC</i>
<code>P09 dISP</code> <i>Angle display</i>	Angle display	+/- 180° 360° +/- ∞	<i>180</i> <i>360</i> <i>ENDLESS</i>
<code>P17 CLSS</code> <i>Classification</i>	Sorting mode	Sorting on Sorting off	<i>CLSS ON</i> <i>CLSS OFF</i>
<code>P18 CLSS</code>	Lower sorting limit	(ensure that P18 < P19)	
<code>P19 CLSS</code>	Upper sorting limit	(ensure that P19 > P18)	

Parameter	Meaning	Function / Effect	Setting
P23 dISP Display	Display value with measured value output	Concurrent display, no freeze	ACTL
		Frozen display / update with signal	HOLD
		Frozen/concurrent display	STOP
P30 dIF Direction	Counting direction	Normal (Positive)	POS
		Inverse (Negative)	NEG
P36 SUBd Subdivision	Angle subdivision 400, 250, 200, 100, 80, 50, 40, 25, 20, 10, 8, 4, 2.5, 2, 1, 0.4, 0.2		
P37 StEP Counting mode		0-1-2-3-4-5-6-7-8-9-0	1
		0-2-4-6-8-0	2
		0-5-0	5
P38 dEC Decimal point	Places after decimal 1 / 2 / 3 / 4 / 5 / 6		
P43 REF Reference marks		One reference mark	SINGLE
		Distance-coded with 500 • SP (SP = signal period)	500
		Distance-coded with 1000 • SP (e.g. for ROD 250 C / ROD 700 C)	1000
		Distance-coded with 2000 • SP	2000
		Distance-coded with 5000 • SP	5000
P44 REF Reference mark evaluation		Evaluation	REF ON
		No evaluation	REF OFF
P45 ENCD Encoder	Encoder monitoring	No monitoring (Alarm Off)	ALARM OFF
		Contamination	ALARM C
		Frequency	ALARM F
		Contamination and frequency	ALARM CF
P50 U24 Baud rate	BAUD	110, 150, 300, 600, 1200, 2400, 4800, 9600	
P51 U24 Additional line feeds	L INEFD.	(Linefeed) 0 to 99	
P62 R1 Trigger limit 1	Enter numerical value		
P63 R2 Trigger limit 2	Enter numerical value		
P79 PRSt Preset	Value for datum	Enter numerical value for datum setting over switching input or with ENT key	
		Reset/Preset	No zero reset/Preset with CL/ENT
Zero reset with CL (Set Zero), no preset with ENT	Stt ZERO		
Zero reset with CL and preset with ENT to value in P79	PREStt		
P82 NESG Message	Display after switch-on	<input type="checkbox"/> message displayed	NESG ON
		<input type="checkbox"/> message not displayed	NESG OFF
P85 REF External REF		REF over D-sub connection EXT	EXT ON
		No REF over EXT connection	EXT OFF
P86 MOD Mode	Inhibit PRINT	PRINT inhibited	PR INH OFF
		PRINT not inhibited	PR INH ON

Parameter Settings for HEIDENHAIN Angle Encoders

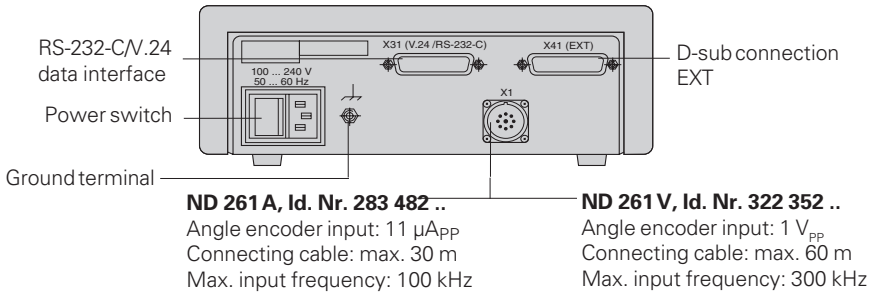
Model 11 μ A _{PP} / 1 V _{PP}	Signal periods per revolution	Reference marks	P43	Display step	Sub-division P36	Count. mode P37	Decim. places P38
/ RPD 486 / ROD 1080	3 600	one	single	0.01° 0.005° 0.001°	10 20 100	1 5 1	 3 3
ROD 250C/ROD 280C RON 255C/RON 285C	9 000	one	single	0.005° 0.001°	8 40	5 1	3 3
ROD 250C/ROD 280C /ROD 282C RON 255C/RON 285C /RON 287C ROD 700C/ROD 780C RON 705C/RON 785C RON 706C/RON 786C	18 000	dist.c	1000	0.001° 0.000 5° 0.000 1°	20 40 200	1 5 1	3 4 4
RON 905 /	36 000	one	single	0.000 1°	100	1	4
ROD 800C/ROD 880C RON 806C/ROD 886C	36 000	dist.c	1000	0.000 1°	100	1	4

Example: Set parameters for any encoder
 Angle encoder with line count $s = 18\,000$
 Desired display step $a = 0.001^\circ$
Subdivision P36 = $360^\circ / s / a = 20$
Counting mode P37 = 1 (display counts 1, 2, 3,)
Decimal places of a: P38 = 3

Convert decimal degrees to degrees, minutes, seconds

1 degree (1°) = 60 minutes (60'); 1 minute (1') = 60 seconds (60")
 1 second (1'') $\approx 0.000278^\circ$

Rear View

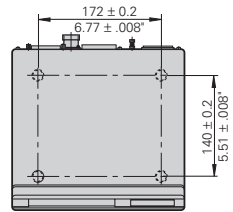


Interfaces X1, X31 and X41 interfaces comply with the recommendations in EN 50178 for separation from line power.

Installation

You can fix the display unit to a flat surface with M4 bolts (see illustration at right).

The units can also be stacked. Adhesive inserts (included in delivery) prevent them from sliding.



Power Supply and Connection



Danger of electrical shock!

Unplug the power cord before opening the housing.
Connect a protective ground. This connection must never be interrupted.



Danger to internal components!

Do not engage or disengage any connections while the unit is under power.
Use only original replacement fuses.

Primary-clocked power supply.

Voltage range: 100 V to 240 V (– 15% to + 10%) **Frequency:** 48 Hz to 62 Hz

Power consumption typ. 8 W **Line fuse:** F 1 A (in unit)

Minimum cross-section of the power line: 0.75 mm²



To increase noise immunity, connect the ground terminal on the rear panel to the central ground point of the machine. (Minimum cross section of the connecting cable: 6 mm²).

Ambient Conditions

Temperature range Operation: 0 °C to + 45 °C (32 °F to 113 °F)
Storage: – 30 °C to + 70 °C (– 22 °F to 158 °F)

Rel. humidity Annual average: < 75%; maximum: < 90%

Weight 1.5 kg

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