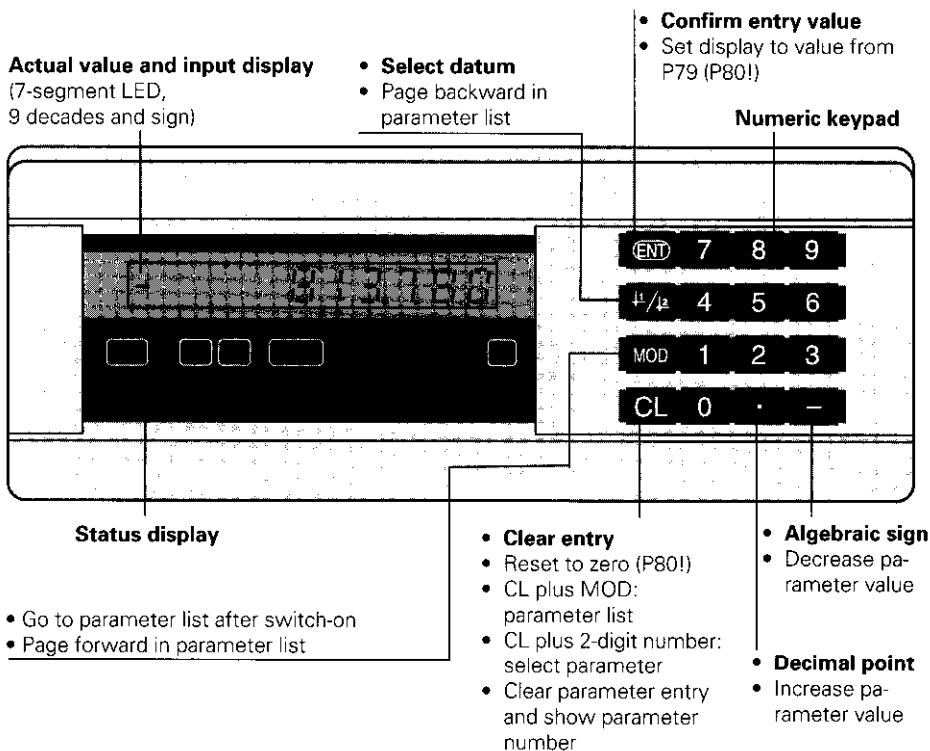




Working with the position display unit

ND 220



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.
in.	Position values displayed in inches.
↓1 / ↓2	Datum 1 / Datum 2 currently active.
SET	Blinking: Waiting for operator to confirm entry values.

The ND 220 is designed primarily for use with HEIDENHAIN linear encoders, such as the LS 303 or LS 603.

HEIDENHAIN linear encoders feature one or several reference marks, which may also be *distance-coded*. When a reference mark is crossed over, it generates a signal identifying that position as a reference point. After switch-on, simply crossing over the reference mark re-establishes 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 20 mm after switch-on suffices to re-establish the datum.

Switch-On



Ent . . . CL

Turn on power (switch located on rear panel)

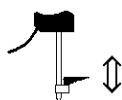
- Display shows `ENT. . . CL`.
- REF blinks.



5 , 6 9 7

Switch on reference mark evaluation

- The 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 220 allows you to set two independent datum points.



Select datum 1 or 2.



4 0

Enter a value, such as 40.



Confirm entered value.

You can switch between datums at any time. Use datum 2 when you want to display incremental dimensions.

Distance-To-Go Mode

The standard setting for the display unit is to show the encoder position value. Particularly on machine tools and for tasks in automation, however, it can be very helpful for the display to instead show the distance remaining to a manually entered nominal position. You can then position the tool by simply moving the axis to the display value zero. **Code number 246 582** provides access to distance-to-go mode.

Display	Meaning
DELTA OFF	No distance-to-go display
DELTA ON	Distance-to-go display

"Traverse to zero" with distance-to-go display

- Select datum 2.
 - Enter the nominal position.
 - Move the axis to zero.
-

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, and P79

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 `↑1 / ↓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 P41 (`[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
P00 CODE	Enter code number 95 148 to access the protected operating parameters		
P01 INCH	Unit of measurement	Display in millimeters	OFF
		Display in inches	ON
P30 DIR Direction	Counting direction	Normal (Positive)	POS
		Inverse (Negative)	NEG
P32 SUBD Subdivision	Subdivision of the encoder signals 4, 2, 1, 0.8, 0.5, 0.4, 0.2, 0.1		
P33 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
		mm display only: 0 - 25 - 50 - 75 - 0	25
		inch display only: 0 - 10 - 20 - 30 - ..	10
P38 DEC Decimal point	Decimal places 1 / 2 / 3 / 4 / 5 / 6 (up to 8 with inch display)		
P41 COMP Compensation	Linear error compensation* - 99 999 < P41 < + 99 999 [µm/m] As of hardware version .1-: - 99 999.9 < P41 < + 99 999.9 [µm/m]		
P43 REF	Reference marks	One reference mark	SINGLE
		Distance-coded with 500 * GP (GP = grating period)	500
		Distance-coded with 1000 * GP (e.g. for LS 303 C / LS 603 C)	1000
		Distance-coded with 2000 * GP	2000
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
P79 PRSE Preset	Datum preset value	Enter a numerical value for the datum — Confirm your entry with ENT	
P80 SET	Reset/Preset	No zero reset/preset with CL/ENT	SET OFF
		Zero reset with CL (Set Zero), No preset with ENT	SET ZERO
		Zero reset with CL and preset with ENT to value in P79	PRESET
P82 MESC Message	Display after switch-on	ENT...CL message displayed	MESC ON
		ENT...CL message not displayed	MESC OFF

* Determine entry value for P41

Example: Displayed measuring length $L_a = 620.000$ mm
Actual length (determined with, for example, the VM 101 comparator system from HEIDENHAIN) $L_t = 619.876$ mm
Length difference $\Delta L = L_t - L_a = -124$ µm

Parameter Settings for HEIDENHAIN Linear Encoders

Model	Signal period [μm]	Reference marks	P43	Display step (Unit: P01)		The following settings apply for mm:		
				mm	inches	Sub-division P32	Count. mode P33	Decimal places P38
LS 303	20	one	single	0.005	0.000 2	4	5	3
LS 603		dist.c.	1 000	0.01	0.000 5	2	1	2
LB 3xx	100	one	single	0.025	0.001	4	25	3

Example: Linear encoder with signal period $s = 20 \mu\text{m}$
 Desired display step $a = 0.005 \text{ mm}$
Subdivision P32 = $0.001 * s / a = 4$; Counting mode P33 = 5
Places after decimal point of a: P38 = 3

Error Messages

To clear an error message **ERROR**:

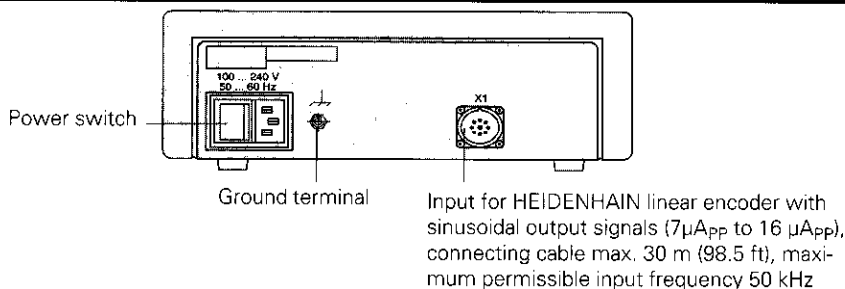
When you have removed the cause of the error,

➤ press CL.

Message	Cause and effect
ERROR 10	Incorrect input value
ERROR 50	Encoder signal too weak (encoder may be contaminated)
ERROR 51	Input frequency too high for encoder input (will occur for example when the scale is moved too quickly)
ERROR 53	Internal counter overflow
ERROR 55	Error while crossing over reference marks
ERROR 80	To clear the error message: Switch off the display unit.
ERROR 83	Should any of these error codes recur, contact your HEIDENHAIN service agency.
ERROR 84	
ERROR 86	
ERROR 99	Check the operating parameters. Should this error code continue to appear, contact your HEIDENHAIN service agency.

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

Rear Panel

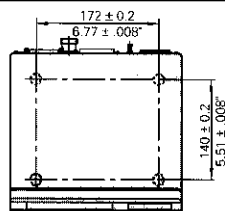


Interface X1 complies with the recommendations VDE 0160, 5.88 for separation from line power.

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, tolerates overvoltage in accordance with VDE 0160, 5.88. Overvoltage tolerance class 2.

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 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 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

DR. JOHANNES HEIDENHAIN GmbH

Dr.-Johannes-Heidenhain-Straße 5
D-83301 Traunreut, Deutschland

☎ (086 69) 31-0

FAX (086 69) 50 61

☎ Service (086 69) 31-12 72

☎ TNC-Service (086 69) 31-14 46

FAX (086 69) 98 99