HEIDENHAIN

Numerical Displays for Length and Angle

POSITIP 855

ND 281 B

ND 970

Contents

Overview of Display Units

ND 281 B

		Position display units
		ND 221 B
Encoder input		1 x ∿ 11 μA_{PP}
Display step	Length	0.01 mm, 0.005 mm, 0.001 mm and finer
	Angle	–
Subdivision		Max. 1024-fold
Data interface		RS-232-C/V.24
Switching inputs and outputs		–
Functions		–

ND 700

	Position displays for milling machines	
	ND 710	ND 750
Axes	X, Y	X, Y, Z
Display step	To 0.001 mm (0.00005 in.)	
Subdivision	Max. 20-fold	
Connection for edge finder	–	
Data interface	–	
Datums/Tool data	2 datums (switchable to 9), 1 tool	
Functions	Distance-to-go display	
	Hole patterns (bolt hole circles, linear hole p Tool radius compensation	
	Setup functions for datum acquisition with the tool	

POSITIP 855

	Position displays with graphic functions for
	POSITIP 855
Axes	4 from X, Y, Z, U, V, W, A, B, C
Display step	To 0.001 mm and finer
Subdivision	Max. 128-fold
Connection for edge finder	For KT
Data interface	RS-232-C/V.24
Datums/Tool data	99 datums, 99 tools
Program memory	For max. 2 000 blocks
Functions	Distance-to-go display with graphic position
	Probing functions with KT edge finder, hole hole patterns), rectangular pocket rough-out

Display units for measuring devices, adjusting and inspection equipment, and for automation		
ND 281 B	**ND 282 B**	**ND 231 B** **Sum/difference display**
1 x ∿ 11 μA_{PP} or ∿ 1 V_{PP} selectable	1 x ∿ 11 μA_{PP}	2 x ∿ 11 μA_{PP}
0.1° to 0.000 1°	–	
	Max. 200-fold	Max. 1024-fold
	BCD	RS-232-C/V.24
Via D-sub connection		
Sorting and tolerance checking		
Min/max evaluation		Sum/difference display

		Position displays for lathes	
ND 720	**ND 760**	**ND 730**	**ND 770**
X, Y	X, Y, Z	X, Z	X, Z_0, Z
To 0.001 (0.000 05 in.) and finer			
Max. 1024-fold			
For KT		–	
RS-232-C/V.24		–	
		1 datum, 9 tools	
patterns)		Radius diameter display	
		–	Separate/sum display for Z and Z_0
Probing functions for datum acquisition with the KT edge finder		Setup functions for datum acquisition with the tool	

milling machines	**Position displays** with graphic functions **for lathes**
	POSITIP 855
	X, X_0, Z, Z_0
	1 datum, 99 tools
ing aid	
patterns (bolt hole circles, linear , tool radius compensation	Turning with oversizes, multipass milling, taper calculator, radius/diameter display, separate/sum display for X and X_0 as well as Z and Z_0

Position Encoders for the Displays

The ND 200 series, ND 700 series and POSITIP can display position values measured with **incremental linear encoders** from HEIDENHAIN with sinusoidal output signals and signal levels of approximately 11 μA_{PP} (i.e., 7 to 16 μA_{PP}).

Exceptions

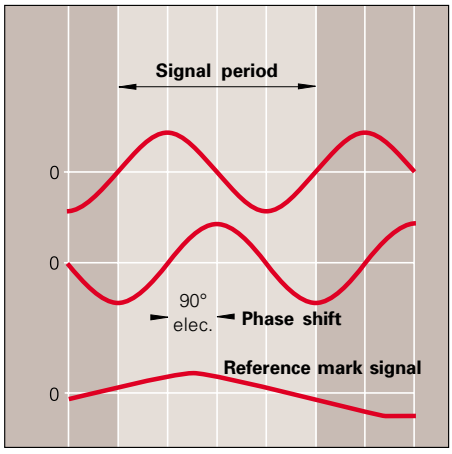
• The **ND 281 B** and **POSITIP 855** feature additional functions for angle display. This makes it possible to connect either **linear** or **angular encoders.**

• The **ND 281 B** features one input each for **11 μA_{PP}** and **1 V_{PP}** signals. The active encoder input is selectable via parameter.

Older versions of HEIDENHAIN linear encoders with sinusoidal output signals have signal levels of max. 40 μA_{PP}. These encoders can be connected only to the POSITIP series displays. For these displays the signal input can be defined by parameter.

Signal Processing

HEIDENHAIN linear and angle encoders deliver two sinusoidal measuring signals, phase-shifted by 90°, and one or several reference mark signals. The sinusoidal measuring signals are frequently subdivided in the display unit in order to attain a measuring step that is finer than the signal period. The subdivision factor can be defined by parameter in the display unit.



Sinusoidal measuring signals

Examples for calculating the subdivision factor:

• Linear encoders

Desired display step:	1 µm
Signal period:	20 µm
→ Subdivision factor:	
	20 µm/1 µm = 20

• Angle encoders

Desired display step:	0.001°
Line count:	18 000
→ Signal period:	360°/18 000
→ Subdivision factor:	
	(360°/18 000)/0.001° = 20

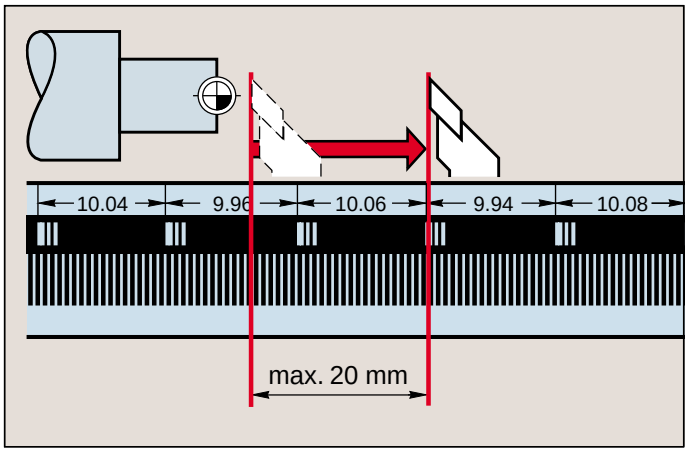
• Rotary encoder on leadscrew for linear measurement

Desired display step:	0.001 mm
Screw pitch:	10 mm
Line count of the encoder:	1000
→ Subdivision factor:	
	(10 mm/0.001 mm)/1000 = 10

Reference Marks and Datums

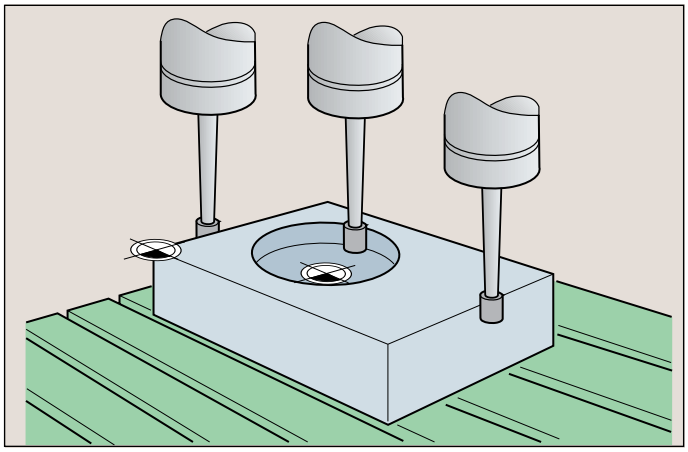
Reference Marks
To measure *incrementally* means to measure by counting. An absolute reference is provided on the scale by a mark which, when traversed, produces a signal assigned to exactly one measuring step. This makes it possible to reestablish in each axis the assignment of display values to positions as last defined by **datum setting.**

To speed and simplify the referencing procedure, many HEIDENHAIN linear and circular scales have distance-coded reference marks. With these encoders, the absolute position value can be reestablished after traversing two successive reference marks, or at most 20 mm (LS, LF) or 80 mm (LB) traverse, or 20° for angle encoders.



Datum Setting

Datum Setting with the Edge Finder
The milling machine display units ND 720, ND 760 and POSITIP 855 feature a connection for the HEIDENHAIN **KT** edge finder (see page 26). These displays include the datum finding features "workpiece edge as datum" and "workpiece center line as datum." POSITIP 855 also provides a "circle center as datum" function. The edge finder is moved toward the workpiece edge until it makes contact; the display immediately records the exact position, automatically taking the radius of the stylus tip and the direction of approach into account.



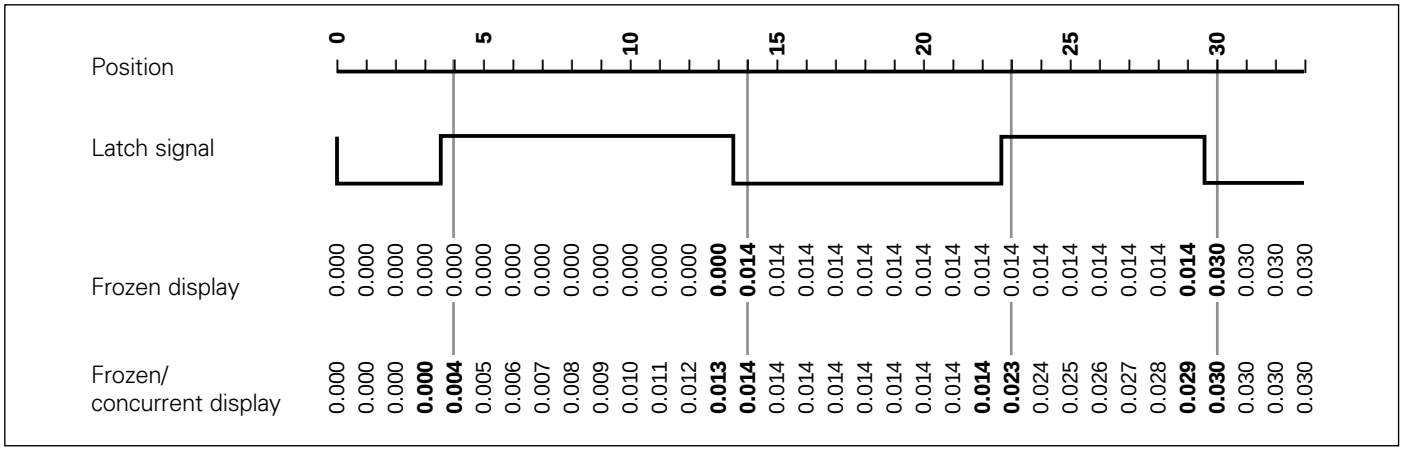
Datum Setting with the Tool
The probing functions can also be performed using the tool, for example with the ND 710 and ND 750 which do not support the edge finder. The display units automatically compensate the tool radius during contact.

Features of ND 200 Series

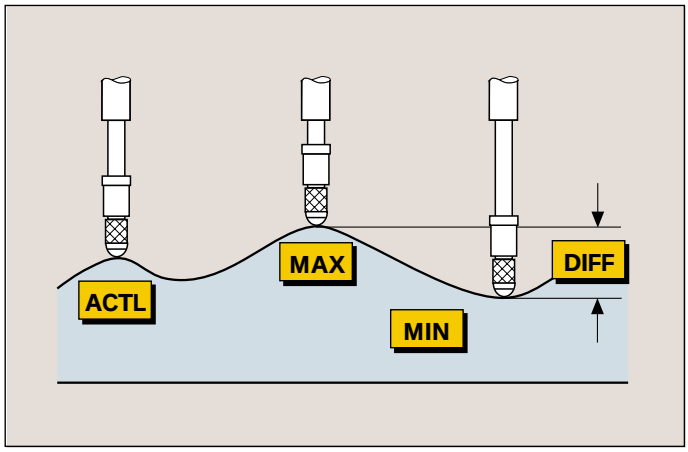
Display Freeze
A specific position value can be held in the display as long as desired. The true position value is counted internally until a fresh display value is called.

The Display Freeze feature operates in one of two modes:
• **Frozen display** — the display value is frozen by the first latching signal. Every further latch signal updates the display to the current measured value, and the display **remains frozen** at the new value.

• **Frozen/concurrent display** — the display freezes only as long as the latch signal is present. With the signal off, the display shows the current measured values.

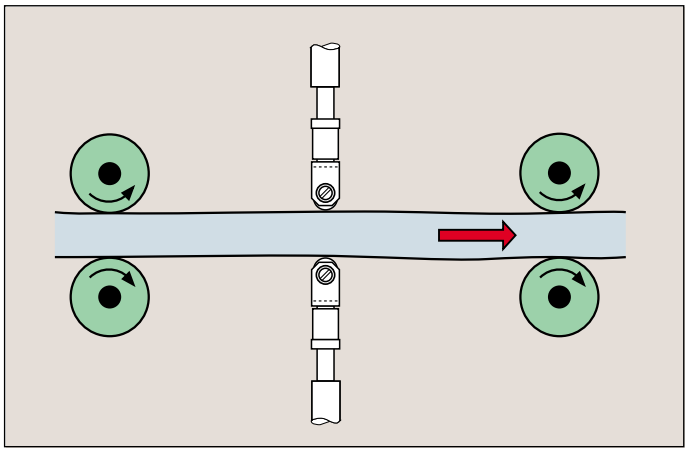


Minimum/Maximum Value Storage
The **ND 281 B** and **ND 282 B** display units can store the minimum and maximum values from a series of measurements. When such a series is started — either via MOD key or through a switching input at the D-sub connection — the display stores the first measured value as the minimum and maximum values. Every 0.55 ms the display then compares the current measured value with the values in memory; it stores a new value if the measurement is greater than the stored maximum or less than the stored minimum value. At the same time the display also calculates and stores the difference (DIFF) of the MIN and MAX values.

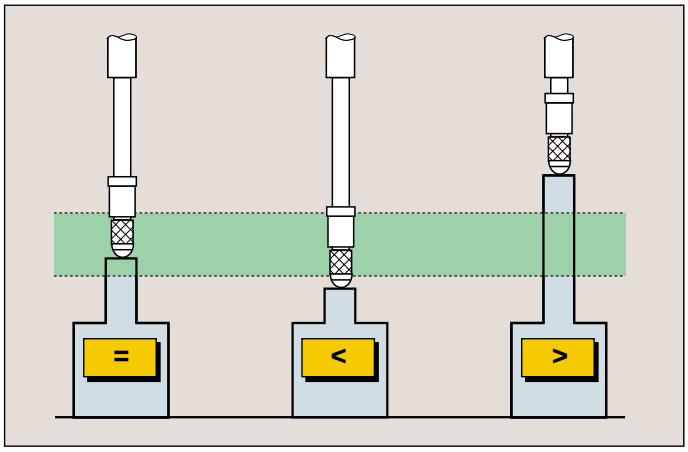


The minimum, the maximum, the difference between the two values, or the current measured value can be called either via the keypad or through a switching input of the D-sub connection. When a new series is started the internal MIN/MAX/DIFF memory is automatically reset.

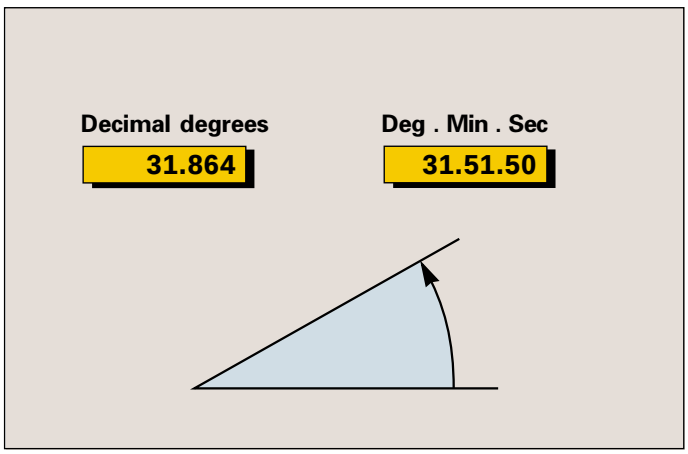
Sum/Difference Display
The **ND 231 B** accepts simultaneous input from two length gauges. It calculates and displays either the sum or the difference of the two measured values. It can also display the measured values from either one of the two gauges. The desired mode is selected either via keypad (in the operating parameters) or through the switching inputs.



Sorting and Tolerance Check Mode
The **ND 231 B, ND 281 B** and **ND 282 B** can inspect parts for compliance with tolerances and sort them into groups. The display unit compares the measured value with an upper and lower limit that has been entered through the keypad. A status display indicates with one of the three respective symbols <, =, and > whether the measured value lies below, within or above the limit values, and sends a corresponding signal to the switching outputs of the D-sub connection. This information can also be output through the data interface.



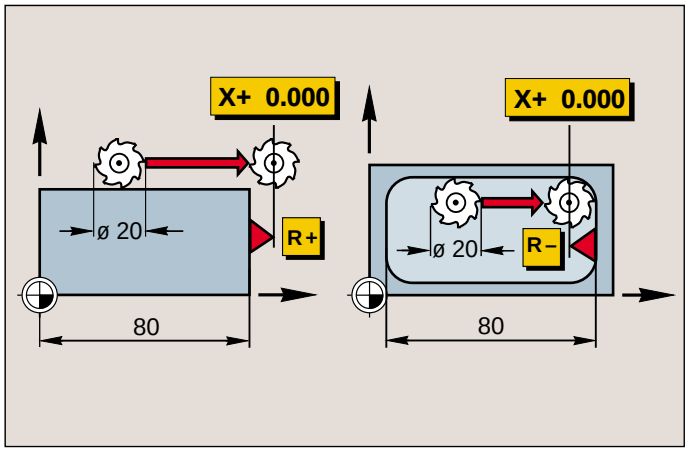
Angle Display with the ND 281 B
The ND 281 B display unit can be switched by parameter to angle display. It presents angle values either in decimal degrees or in degrees, minutes, seconds. The angle display range can extend from –∞ to +∞, from 0° to 360° or from –180° to +180°.

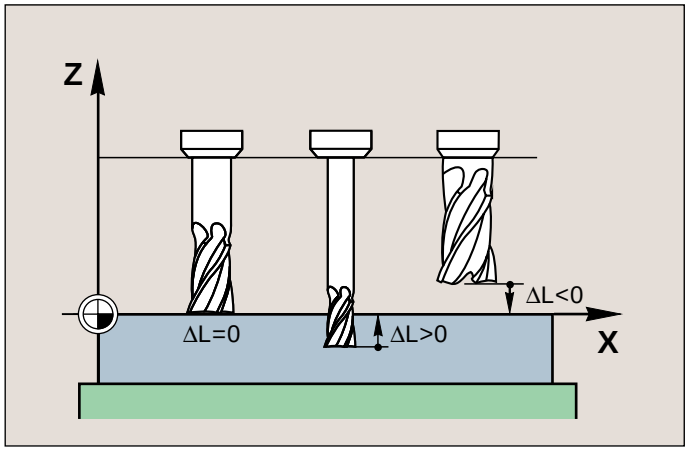


Features of the ND 700 Series and POSITIP
Tool compensation

Tool Offsets for Milling Machines
The display units for milling machines can store tool diameters, while POSITIP can also save length and axis values. POSITIP 855 provides a table for up to 99 tools; the data can be from preset tools or from tools that have been measured in the machine.

During positioning in distance-to-go mode, the display units compensate the tool radius in the working plane (R+ or R–). POSITIP can also compensate the tool length (ΔL) in the spindle axis.

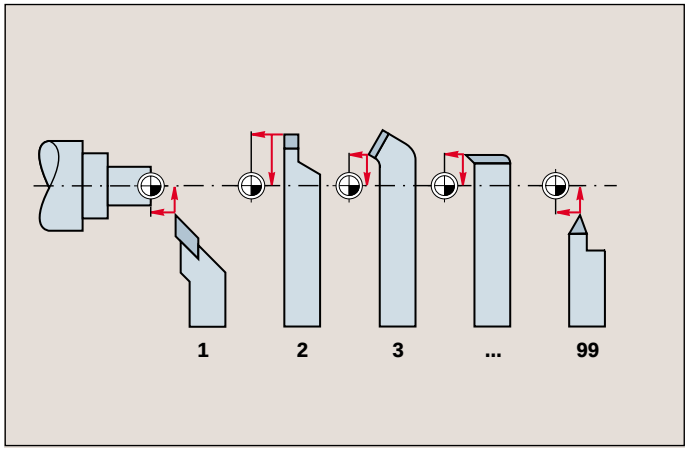




Tool Offsets for Lathes
The ND 730 and ND 770 can store dimensional data for up to 9 tools. POSITIP 855 can even manage up to 99 tools.

Upon turning the first diameter with the tool, either the tool position is entered directly, or the current display value is "frozen" (HOLD POS) and the tool is retracted from the workpiece. The turned diameter can then be measured and keyed into the display.

Changing Datums: The stored tool offset values remain valid even after a workpiece or workpiece datum has been changed. The tool data are automatically referenced to the new datum.



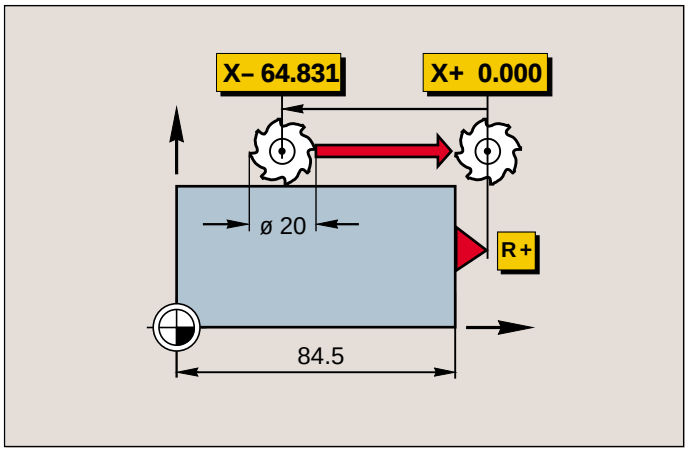
Distance-to-go display

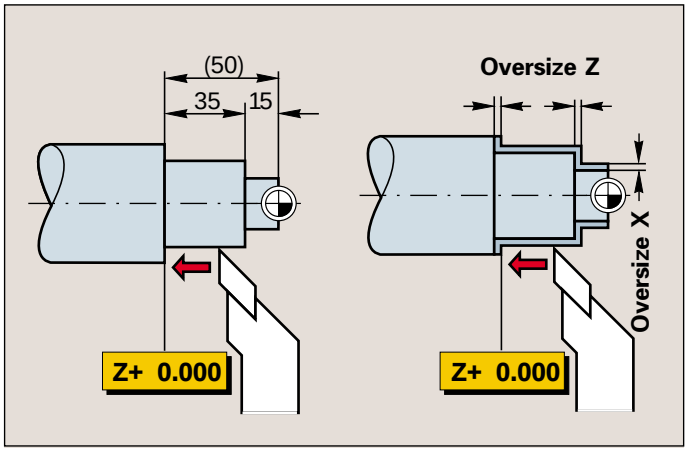
The distance-to-go display on the ND 700 series and POSITIP dramatically simplifies tool positioning. The user enters the next nominal position, and the display shows the distance remaining to the target position. The user then simply moves the tool to the display value zero.

Distance-to-go display can also compensate the cutter radius for **milling** (see opposite page) so that parts can be machined directly from the drawing dimensions without any additional calculations.

POSITIP for **turning** can compensate oversizes in the distance-to-go display.

POSITIP provides distance-to-go display with **graphic support:** a square cursor moves into a sight, as the tool reaches the target position. As an alternative to this feature, the absolute value of the current position can be shown.

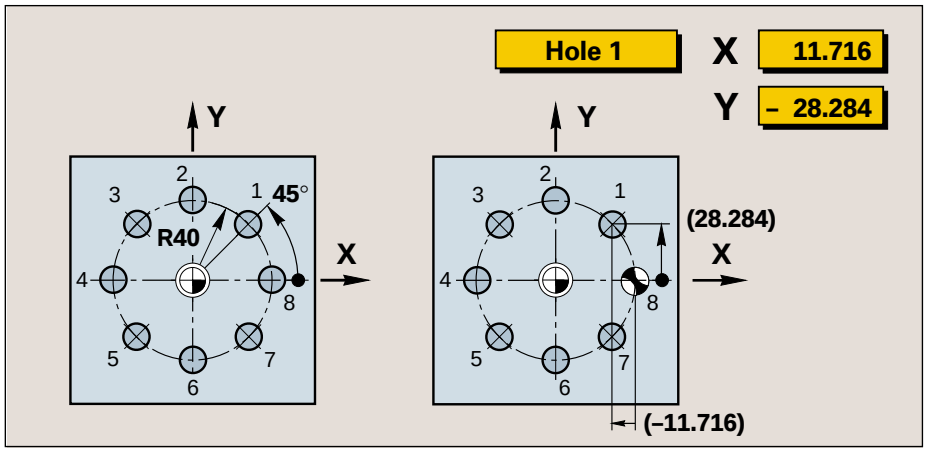


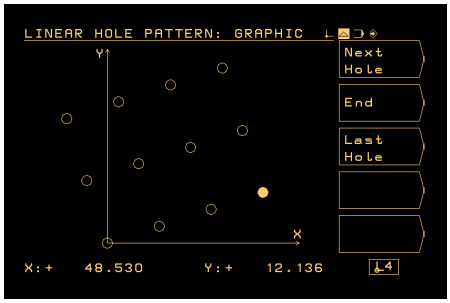


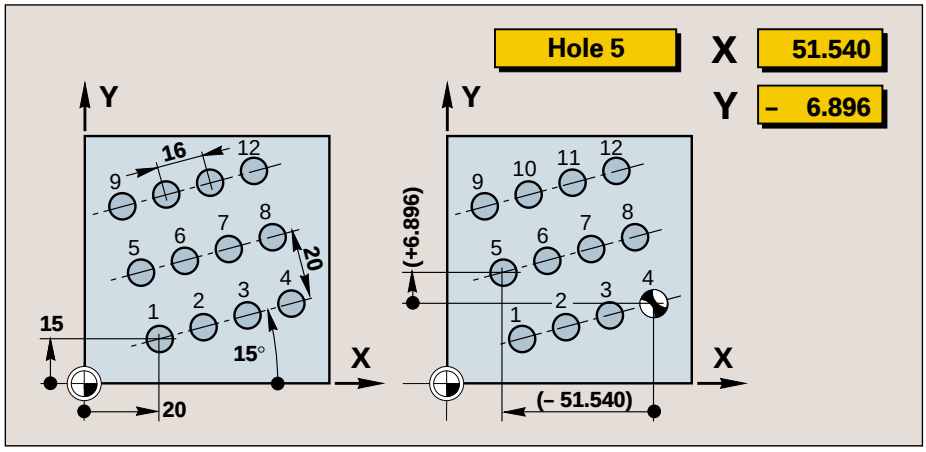
Hole patterns and rectangular pockets

Bolt Hole Pattern Calculation
The ND 710/720, ND 750/760 and POSITIP calculate coordinates for **bolt hole circles** (full or segment) and **linear hole patterns** from the data given in the drawing. The tool is then positioned with distance-to-go display.

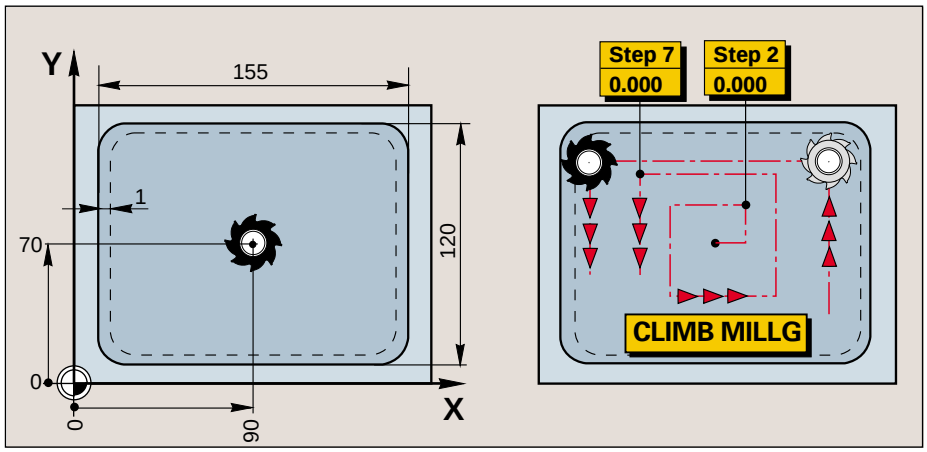
The POSITIP also provides an especially useful feature: a **graphic display** of the programmed pattern.







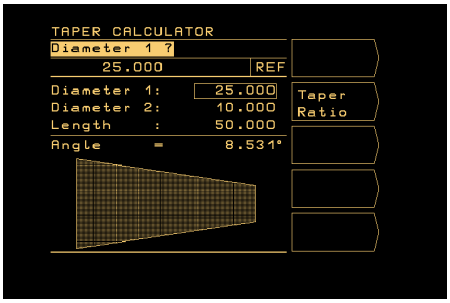
Milling and Roughing Out Rectangular Pockets
From the geometrical data on the drawing, POSITIP 855 calculates the necessary positioning steps, which can then be shown in the distance-to-go display.



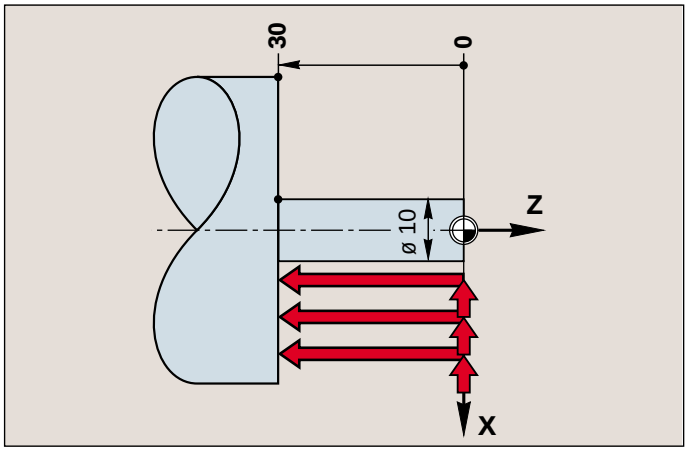
Features for working with lathes

Radius/Diameter Display
All HEIDENHAIN display units for lathes show positions in the cross-slide axis in values of either radius or diameter. A simple keystroke switches between the two settings.

Taper Calculator
If the workpiece drawing doesn't show the angle of a taper, the ND 730/ND 770 and POSITIP will calculate the angle, either from the taper ratio or from the two diameters and the taper length.

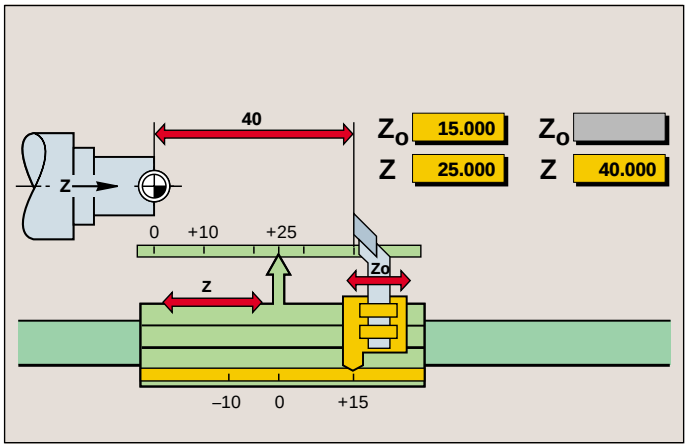


Multipass Cycle
POSITIP features a turning cycle for turning a shoulder in repeated passes. It shows the distance remaining to the target position both in the longitudinal and tool axes. The machinist decides on the proper infeed increment.



Sum Display of Longitudinal Axes
The ND 770 and POSITIP for lathes show the positions of the saddle and top slide either separately or as a sum of the two.

If separate display is selected, the position values are referenced to the datum for each axis. For sum display, the counter adds the two values. The user reads the absolute position of the tool in relation to the workpiece datum —without having to calculate.

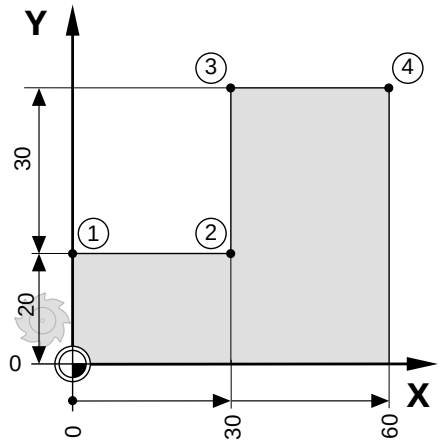


POSITIP
Programming features

The Programmable POSITIP 855
POSITIP stores up to 20 programs with a total of 2000 blocks. The programs can either be keyed in step by step or "captured" through teach-in programming. If an identical pattern appears several times on the same workpiece, it can be entered once as a subprogram and repeated as often as needed. Fixed cycles such as "bolt hole circle," "linear hole pattern" or "rectangular pocket" for milling, drilling and boring, and the "multipass" cycle for turning shorten the programs and greatly reduce the time spent programming.

Example: Milling a shoulder

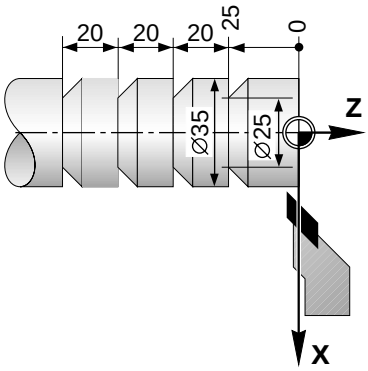
```
0 BEGIN PGM 20 MM
1  Y= +20.000  R+
2  X= +30.000  R-
3 IY= +30.000  R0
4  X= +60.000  R+
5 END PGM 20 MM
```



Example: Turning several recesses on one workpiece

```
0  BEGIN PGM 40 MM
1  X+80.000
2  Z+20.000      } Pre-positioning
3  X+40.000
4  Z-5.000

5  LBL 8
6  IZ-20.000     } Infeed
7  X+25.000      } Retracting
8  X+40.000
9  CALL LBL 8 REP 3/3
10 X+80.000      } Retracting
11 END PGM 40 MM
```



Interfaces
RS-232-C/V.24

The ND display units and POSITIP feature serial data interfaces as prescribed in the international standards RS-232-C of the EIA and the equivalent V.24 of the CCITT. The interfaces provide serial data output in ASCII code.
The **data format** consists of
- a start bit
- 7 data bits
- a parity bit (even)
- 2 stop bits

A line feed (CR/LF) follows each output. Additional blank lines can be defined by parameter.

The **starting event** for measured value output varies depending on the display unit

Started by	ND 2xx	ND 720/760	POSITIP
Keyboard	MOD	–	
Data interface	CTRL B	CTRL B	CTRL B
D-sub connection EXT	Pulse or contact	Pulse or contact	Pulse or contact
Edge Finder	–	Stylus contact	Stylus contact

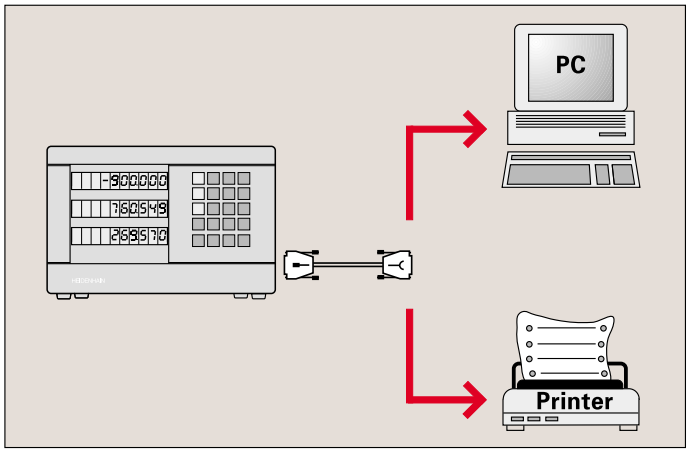
* Function is definable via code number

Measured value output can be **interrupted** with the control character **DC3** and **continued** with **DC1.**

The duration of data transfer depends on the selected baud rate and the number of additional blank lines. Both are definable in the NDs and POSITIP by parameter.

Program Storage
POSITIP can send and receive programs through the RS-232-C/V.24 data interface.

A HEIDENHAIN data transfer cable (Id. Nr. 274 545-xx) is available for establishing a connection to a PC or printer.



BCD

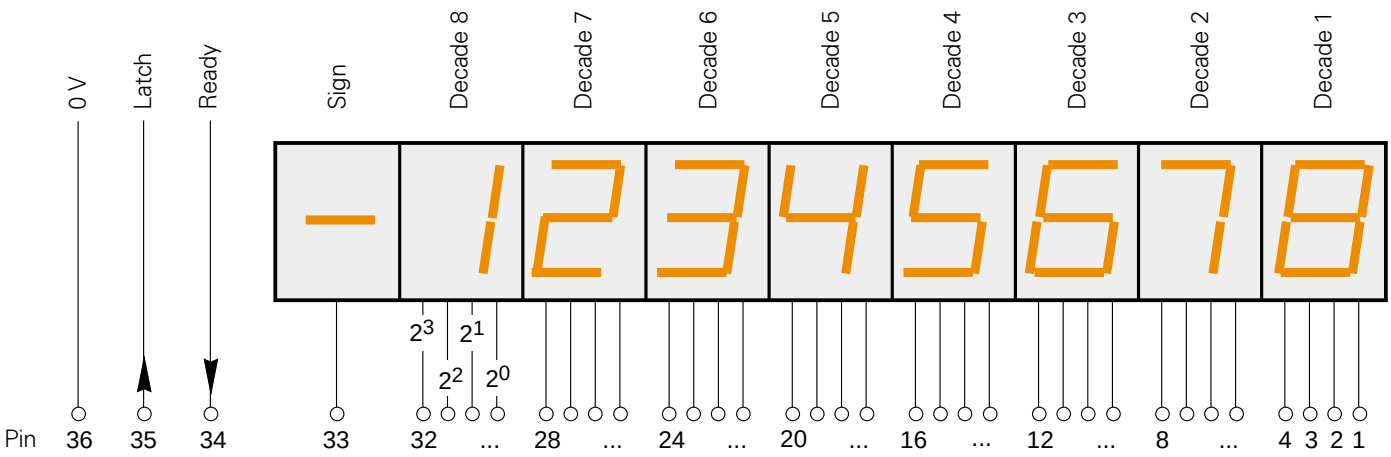
BCD Data Interface (ND 282B)
All data in BCD code are transmitted in parallel output. After a **latch command** the ND stores the current measured value in its internal buffer. This latch command is released either
- **at the ND** by pressing the MOD key until the PRINT indicator blinks (only for "slow" data output), or
- **externally** through a latch command at the **D-sub** or the **BCD connection** (pulse or contact),
- **internally** through a periodic clock **(concurrent data output).** The clock time is selectable from 0.2 to 25.6 µs.

A data strobe at the BCD output indicates to the connected electronics that the measured value is stable (ready message).

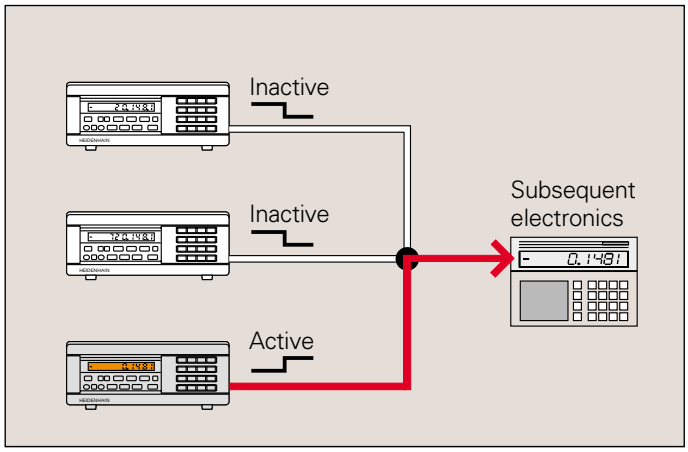
There are two selectable **data output speeds**:
- **slow** — the display value is output after 8 to 21.5 ms (depending on the selected mode of operation),
- **fast** — the measured value referenced to datum 1 will be output after 0.6 µs; MIN/MAX/DIFF values cannot be output.

Signal Levels
TTL output:
$U_L \leq 0.4\ V$ at $I_L \leq 6\ mA$
$U_H \geq 3.8\ V$ at $I_H \leq 2.6\ mA$

Latch signal: (pulse or contact)
$U_H \geq 3.8\ V$ at $I_{max} \leq 6\ mA$
$U_L \leq 0.9\ V$ at $I_{max} \leq 6\ mA$
or TTL levels (internal pull-up resistor: 10 kΩ)



Connection of Several NDs with BCD Data Interface to One Subsequent Unit
The BCD output of the ND 282B display unit has a three-state function. Through its separate D-sub input, all data lines of an ND can be switched to high impedance in order to deactivate its BCD output. This makes it possible to control the line to transmit the measured values of only **one** display unit to the subsequent electronics.

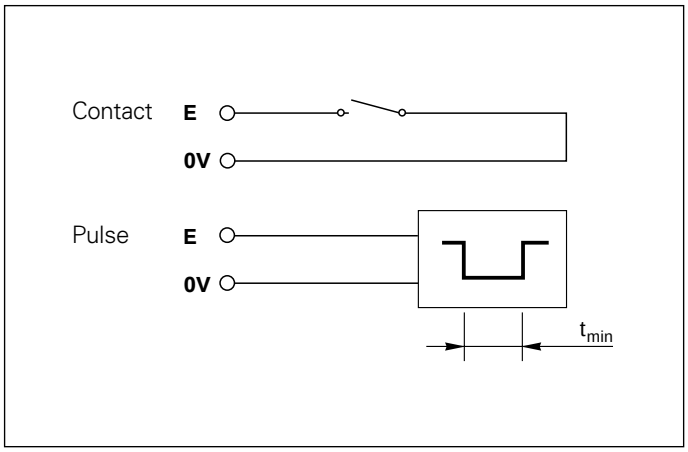


Switching Inputs

All switching inputs respond either to contact or pulse. **Exception:** The switching inputs for transmitting measured values over the data interface are separate for contact and pulse (see page 15 "Interfaces").

The switching input E is active when a Low signal U_L is applied (contact or pulse to 0 V).

Signal levels
$-0.5\ V \leq U_L \leq 0.9\ V$ at $I_L \leq 6\ mA$
$3.9\ V \leq U_H \leq 15\ V$



ND 2xx: $t_{min} \geq$ 55 ms

ND 720/760:
$t_{min} \geq$ 100 ms
POSITIP: $t_{min} \geq$ 100 ms

Functions of the Switching Inputs
To find the functions available with the various display units, see the tables beginning on page 20.

Zero Reset/Preset
Each axis can be set by an external signal to the display value zero or, with the ND 200 series, to a value stored in a parameter (SET).

Activating or Deactivating REF Mode
(ND 200 series)
After switch-on or an interruption in power, the display unit can be switched externally to REF mode. The next signal then deactivates REF mode (switchover function).

Ignoring the Reference Mark Signal
(Reference pulse inhibitor; ND 200 series)
When the input is active the display unit ignores all reference mark signals. This feature is typically used for linear measurement via rotary encoder and leadscrew; at a certain position, a cam switch reactivates reference signal reception.

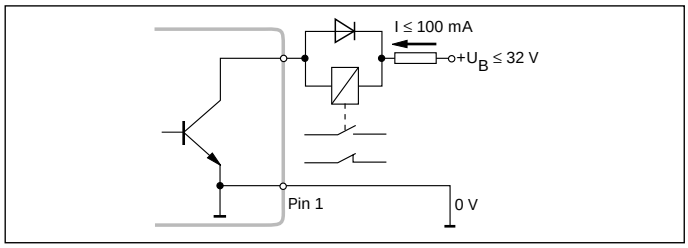
External Min/Max Selection Switching the MIN/MAX/DIFF/ACTL Display
The Minimum/Maximum display feature in a series of measurements can be activated externally for the ND 200 series (the Low signal must remain on at the switching input). The keyboard of the ND is nonfunctional during this time. The MIN/MAX/DIFF/ACTL display and the START of a new measurement series are controlled externally via additional switching inputs.

Additional Inputs for the ND 231 B
The ND 231 B has two encoder inputs. Two switching inputs make it possible to control which encoder is used for position display; two further switching inputs control the display of the sum or difference from the two encoders.

Switching Outputs of the ND 200 Series

Certain measured value display units of the **ND 200 series** feature freely definable trigger points that can be used through the switching outputs for tasks in automation.

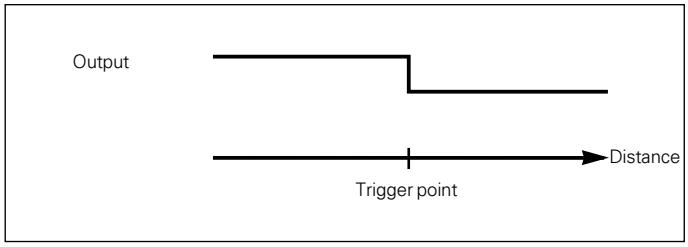
Switching Outputs of the ND 200 Series
The ND 200 series displays have open-collector outputs that switch to 0 V (active = Low).



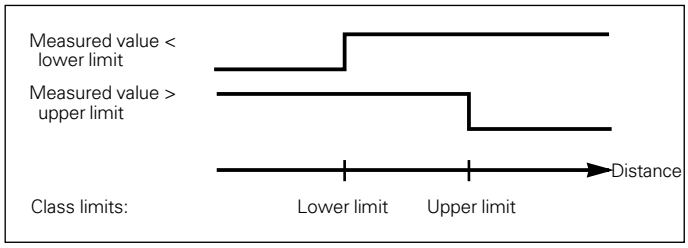
Delay of Signal Output:
t_d ≤ 22 ms; when additional features are active (such as for measurements in a series) the delay time may increase.

Signal Levels
U_L ≤ 0.4 V at I_L ≤ 100 mA
U_H ≤ 32 V at I_H ≤ 10 µA

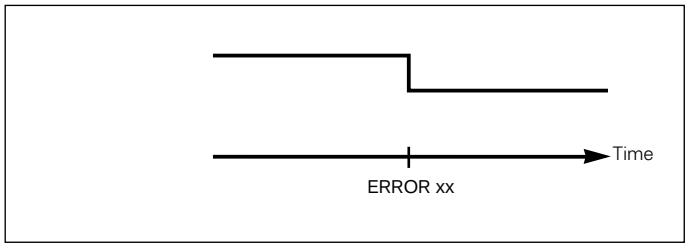
Trigger Points (ND 200 series)
When the measured value reaches trigger points defined by parameter, the corresponding output becomes active. Up to two trigger points can be defined. There is a separate output for the "zero" trigger point (see "Zero Crossover" below).



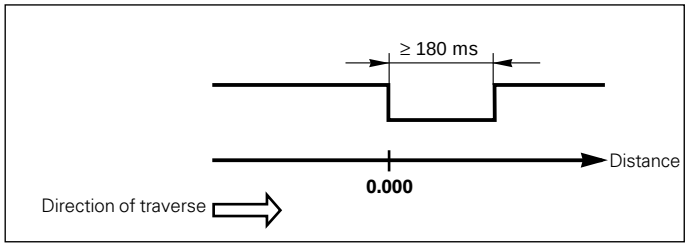
Sorting Limits
Limits for the sorting mode are defined by parameter. When the measured value exceeds one of the limits the corresponding outputs become active.



Switching Signal for Errors
The ND 200 series displays constantly monitor the measuring signals, the input frequency, the data output, etc. for errors. If an error occurs that may distort the measurement or corrupt the data, the display activates a switching output. This makes it possible to monitor proper function during automated processes.

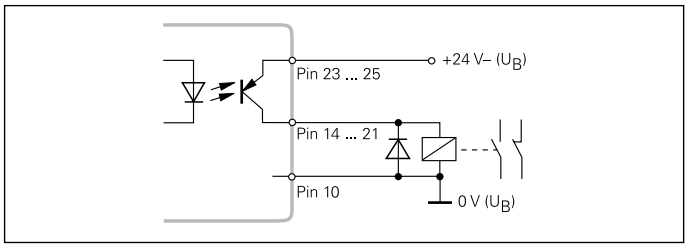


Zero Crossover
At the display value zero the corresponding output becomes active. The minimum signal duration is 180 ms.



Switching Outputs for POSITIP 855

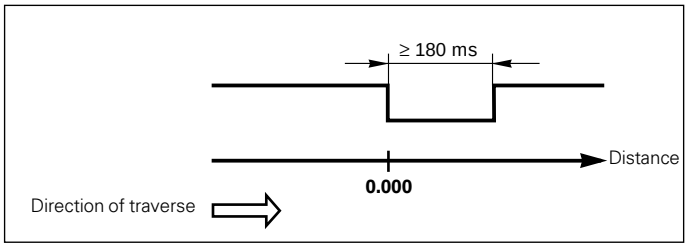
POSITIP 855 features emitter circuit outputs that switch to 0 V (active = Low).



Delay of Signal Output
$t_d \leq$ 80 ms when the accuracy equals the measuring step;
$t_d \leq$ 5 ms with an accuracy of 1/128 of the grating period of the connected encoder.

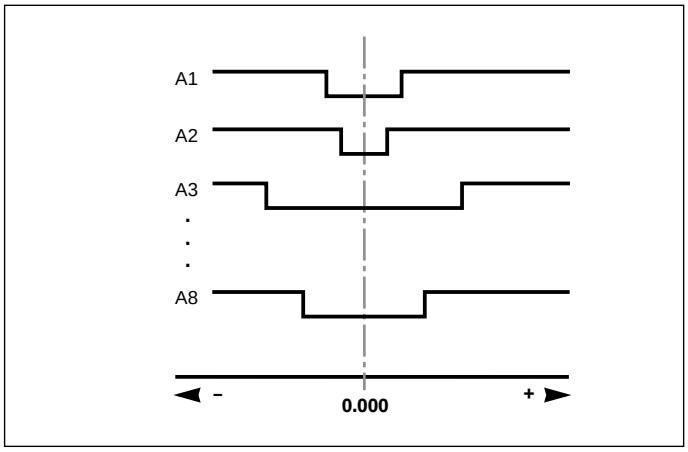
Signal Levels
$U_L \leq$ 0.4 V at $I_L \leq$ 100 mA
$U_H \leq$ 24 V at $I_H \leq$ 10 µA

Zero Crossover
At the display value zero, the corresponding output becomes active. The minimum signal duration is 180 ms.



Switch-Off Range
Up to eight switch-off ranges can be defined by parameter and assigned to the axes as desired. The switch-off ranges are symmetrical to the display value zero.

Switch-off signals can then be generated in the distance-to-go (traverse to zero) display mode for any desired target position.



Ready for Operation/Emergency Stop
This output becomes active when an error occurs, such as hardware or checksum errors, that impairs the proper function of the display unit.

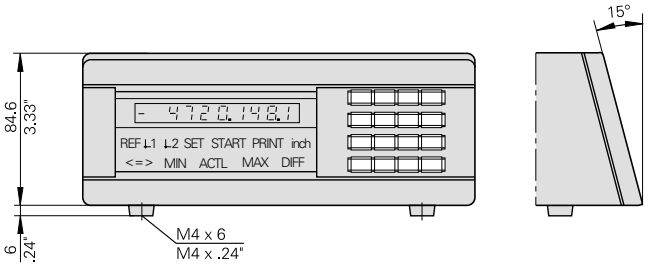
ND 200 Series

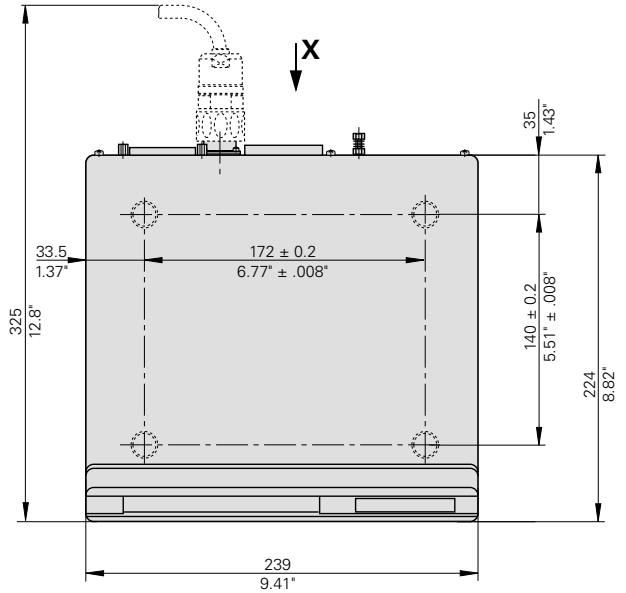
	Length Display	Length and Angle Display	Length Display	Sum/Difference Display
	ND 221 B	**ND 281 B**	**ND 282 B**	**ND 231 B**
Encoder inputs	1 x ∿ 11 μA_{PP}	1 x ∿ 11 μA_{PP} or 1 x ∿ 1 V_{PP}, selectable	1 x ∿ 11 μA_{PP}	2 x ∿ 11 μA_{PP}
Input frequency	Max. 100 kHz	*11 μA_{PP}:* max. 100 kHz *1 V_{PP}:* max. 500 kHz	Max. 50 kHz	Max. 100 kHz
Signal periods	From 0.128 µm to 12800 µm			
or **Line count**	–	1800 to 180000 per 360°	–	
Subdivision factor	Up to 1024-fold		Up to 200-fold	Up to 1024-fold
Display step * Length	0.000001 mm to 0.5 mm			
Angle	–	0.000002° or 0.2" to 0.1°	–	
Display **Position values**	9 decades plus sign; REF, inches, datum 1/datum 2, SET datum setting			
Status display	Scaling factor (SCL)	PRINT, MIN/MAX/DIFF/ACTL, START, sorting and tolerance checking (< = >), scaling factor (SCL)		
Functions	• REF reference mark evaluation for distance-coded or single reference marks • Fast zero reset • 2 datums			
	–	• Sorting and tolerance checking • Minimum/maximum evaluation		• Sorting and tolerance checking • Sum/difference display
Axis error compensation	Linear and nonlinear over 64 compensation points			
Data interface	RS-232-C/V.24		BCD	RS-232-C/V.24
Data transfer rates	110 to 9600 baud		0.2 µs to 25.6 µs **	110 to 9600 baud
Switching outputs for automated tasks	–	• Zero crossover • Trigger points 1 and 2 • Sorting signals "<" and ">" • Error		
Switching inputs for automated tasks		• Zero reset/preset • Measured value output and display freeze (via pulse or contact) • Crossing the reference mark • Inhibit reference pulse X1		
		• External MIN/MAX selection • MIN/MAX/DIFF display • Start measurement series		• X1/X2 display • Sum display • Difference display • Inhibit reference pulse X2
		–	Deactivate BCD	–
Power supply unit	Primary-clocked power supply 100 Vac to 240 Vac (–15% to +10%), 50 Hz to 60 Hz (± 2 Hz)			
Power consumption	8 W			
Operating temp.	0° C to 45° C (32° F to 113° F)			
Protection (EN 60529)	IP 40, front panel IP 54			
Weight	1.5 kg (3.3 lb)			

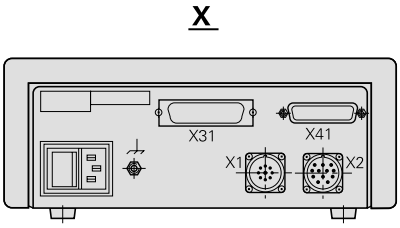
* Depends on the signal period of the connected encoder.
** Latching rate with fast concurrent BCD data output

Dimensions in mm/inches

ND 200 Series



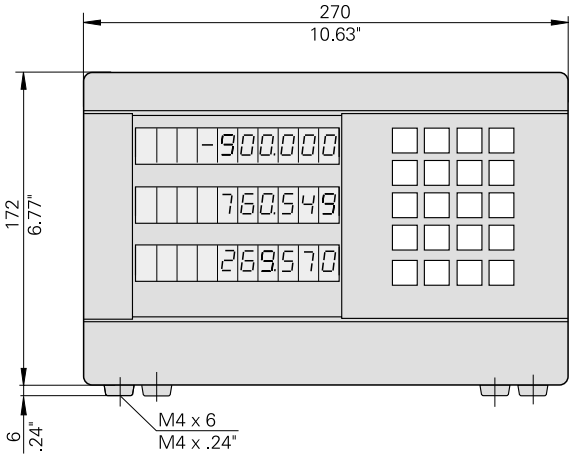


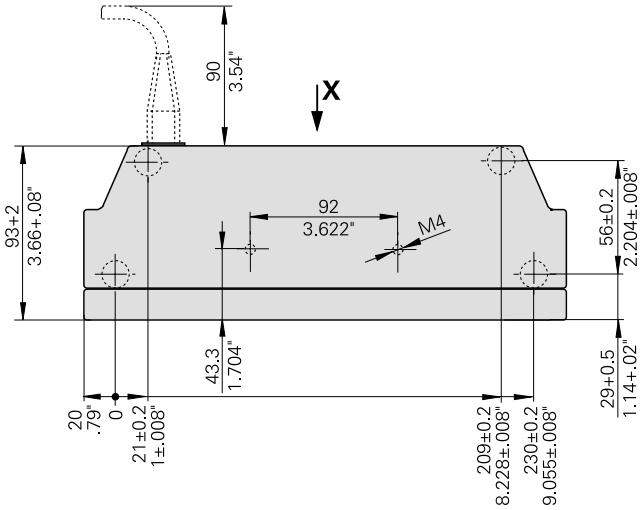


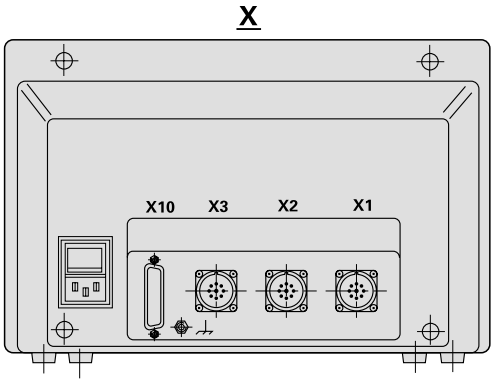
ND 700 Series	For positioning devices, milling, drilling and boring machines				For lathes	
	ND 720	**ND 760**	**ND 710**	**ND 750**	**ND 730**	**ND 770**
Axes	X, Y	X, Y, Z	X, Y	X, Y, Z	X, Z	X, Z_0, Z
Encoder inputs	2 x ~ 11 μA_{PP}	3 x ~ 11 μA_{PP}	2 x ~ 11 μA_{PP}	3 x ~ 11 μA_{PP}	2 x ~ 11 μA_{PP}	3 x ~ 11 μA_{PP}
Input frequency	Max. 100 kHz					
Signal period	2 µm, 4 µm, 10 µm, 20 µm, 40 µm, 100 µm, 200 µm, 12 800 µm		2 µm, 4 µm, 10 µm, 20 µm, 40 µm, 100 µm, 200 µm		2 µm, 4 µm, 10 µm, 20 µm, 40 µm, 100 µm, 200 µm, 12 800 µm	
Subdivision factor	0.1 to 1024		20, 10, 5, 4, 2, 1		0.1 to 1024	
Display step *)	0.000 001 mm to 0.5 mm (0.000 000 05 in. to 0.02 in.)		0.001 mm to 0.2 mm (0.000 05 in. to 0.01 in.)		0.000 001 mm to 0.5 mm (0.000 000 05 in. to 0.02 in.)	
Display values	Axis positions (9 decades plus algebraic sign) Dialog prompts and messages					
Status display	Active axis (SET), REF, distance-to-go (Δ), datum number, inches, scaling factor (SCL)					
	Tool compensation R+, R– Probing functions for "edge" and "centerline"				Tool number Radius/diameter display	
					–	Separate or sum display for Z and Z_0
Features	• REF reference mark evaluation for distance-coded or single reference marks • Distance-to-go mode • mm/inch conversion					
	• 2 datums (switchable to 9), 1 tool • Shrinkage compensation • Calculation of hole patterns (bolt hole circles, linear hole patterns)				• 1 datum, 9 tools	
	Probing functions for datum acquisition with the KT edge finder KT: "edge" and "centerline"		Setup functions for datum finding with the tool			
Axis error compensation	Linear and nonlinear over 64 points					
RS-232-C/V.24 data interface	For transmitting measured values		–			
Data transfer rates	110 to 38 400 baud					
Switching inputs	2 inputs (pulse or contact) for measured data output		–			
Accessories	KT edge finder		–			
	Tilting base					
Power supply	Primary-clocked power supply 100 Vdc to 240 Vdc (–15% to +10%), 50 Hz to 60 Hz (± 2 Hz)					
Power consumption	15 W					
Protection (EN 60529)	IP 40, front panel IP 54					
Operating temp.	0° C to 45° C (32 °F to 113 °F)					
Weight	2.3 kg (5 lb)					

*) Depends on the signal period of the connected encoder.

Dimensions in mm/inches



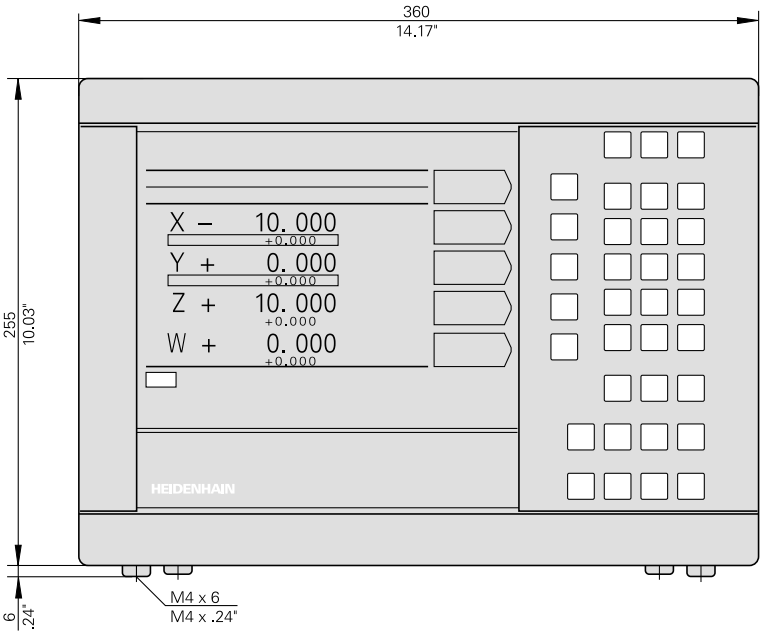


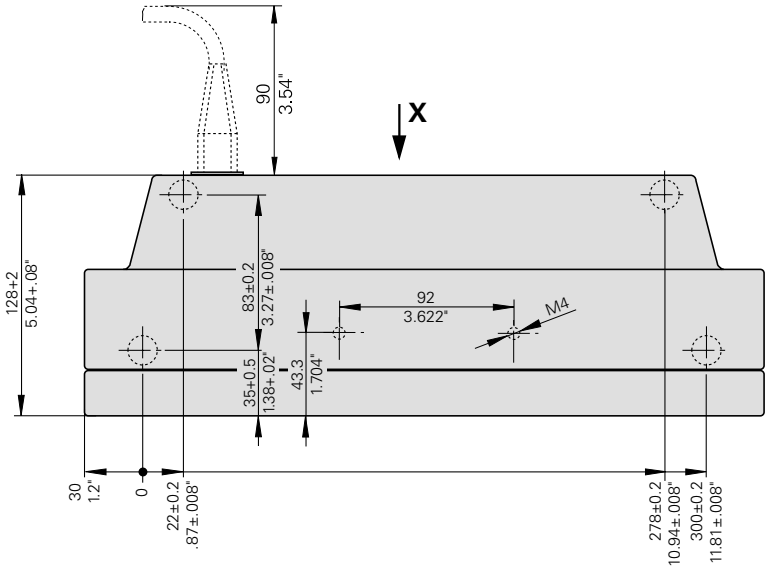


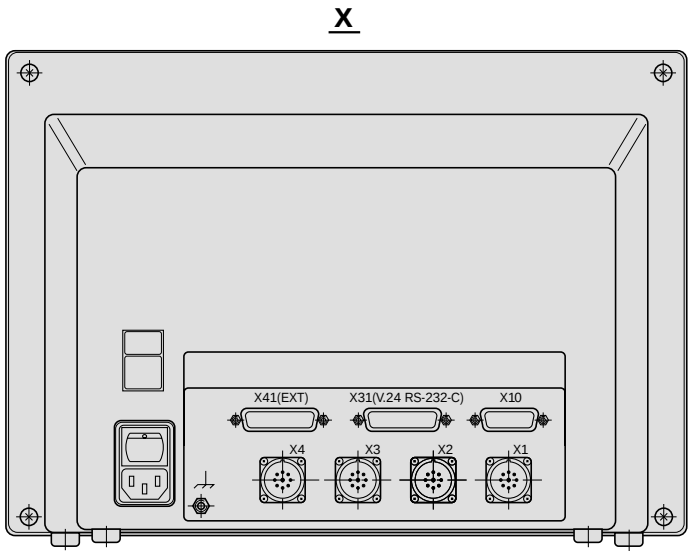
POSITIP 855

		Milling, drilling and boring machines	Lathes
Axes		Up to 4 axes from X, Y, Z, A, B, C, U, V, W	Up to 4 axes from X, X_0, Z, Z_0
Encoder inputs		4 x ~ 11 μA_{PP}, input frequency 100 kHz	
	Signal period	2 µm, 4 µm, 10 µm, 20 µm, 40 µm, 100 µm, 200 µm, 12 800 µm	
or	**Line count**	1800/3600/9000/18 000/36 000/72 000	
Subdivision factor		128, 100, 80, 64, 50, 40, 20, 10, 5, 4, 2, 1, 0.8, 0.5, 0.4, 0.2, 0.1	
Display step		0.000 02 mm to 0.1 mm (0.000 001 in. to 0.005 in.) 0.000 1° or 1" to 1°	
Display content		Position values on the 8.9" flat luminescent screen, dialog prompts and messages, graphical support	
	Status display	Operating mode, REF, distance-to-go positioning cursor, inches, scaling factor, feed rate	
		Datum number Tool radius compensation R–, R+, R0	Tool number Diameter display ∅ Sum display Z_S and/or X_S
Features		• REF reference mark evaluation for distance-coded or single reference marks • Distance-to-go mode with input of nominal positions (absolute or incremental) • Scaling factor • Fast zero reset • **HELP:** on-screen operating instructions • **INFO:** on-screen pocket calculator, stopwatch	
		• 99 datums, 99 tools • Probing functions for datum acquisition with the KT Edge Finder: "Edge," "Centerline," "Circle Center" • Tool radius compensation • Calculation of bolt hole circles and linear hole patterns • Positioning aids for rectangular pocket milling and rough-out • **INFO:** cutting data calculator	• One datum, 99 tools • Freezing the tool position value for back-off • Oversize allowance • **INFO:** taper calculator
Programming		20 programs with a total of 2000 program blocks; subprogramming; teach-in programming	
		Bolt hole circles, linear hole patterns	Multipass cycle
Axis error compensation		Linear and non-linear over 64 measuring points	
Data interface RS-232-C/V.24		For output of programs, measured values and parameters	
	Data transfer rates	110 to 38 400 baud	
Accessories		KT Edge Finder, tilting base	Tilting base
Switching outputs for automated tasks		• 8 switching outputs (24 V), assigned to the axes by parameter • 1 "ready for operation" switching output	
Switching inputs for automated tasks		• 1 for each axis for zero reset • 2 inputs (pulse and contact) for measured value output	
Power supply		Primary-clocked power supply 100 Vdc to 240 Vdc (–15% to +10%), 50 Hz to 60 Hz (±2 Hz)	
Power consumption		24 W	
Operating temperature		0° C to 45° C (32° to 113° F)	
Protection (EN 60529)		IP 40, front panel IP 54	
Weight		4.8 kg (11 lb)	

Dimensions in mm/inches







Accessories

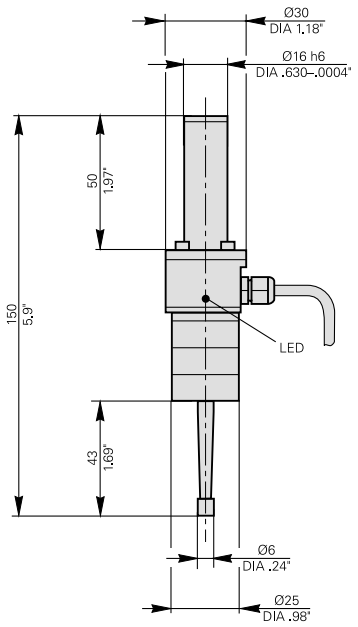
KT Edge Finder
The KT is a 3D triggering probe. The cylindrical stylus is spring mounted in the edge finder housing. When the stylus contacts the workpiece, the edge finder sends a signal via cable to the ND or POSITIP.

Together with the HEIDENHAIN displays ND 720, ND 760 and POSITIP, the KT simplifies workpiece setup and reduces datum setting time.

Tilting Base
You can tilt the display unit forward or backward by up to 20° with an optional tilting base for the **ND 700** series and for **POSITIP 855.**

Dimensions in mm/inches

KT Edge Finder



Tilting Base