	ND 1404
Axes	4 (XYZQ)
Encoder inputs*	∿ 1 V_{PP} or ⊓⊔ TTL (other interfaces upon request)
Subdivision factor*	10-fold (only for 1 V_{PP})
Display step[1)]	Adjustable, max. 7 digits *Linear axes XYZ:* 1 mm to 0.0001 mm *Angular axis Q:* 1° to 0.0001° (00° 00' 01")
Display	8.4" color flat-panel display (touchscreen); resolution: SVGA 800 x 600 pixels, for position values, dialogs and inputs, graphics functions and soft keys
Functions	• Measurement of two-dimensional and three-dimensional features (3-D) • Points measured via crosshairs or rigid probing element • Automatic acquisition of measurement points via touch probe • Programming of features and parts • Measure Magic: automatic recognition of geometries • Graphic display of measurement results, either three-dimensional or in the three projection planes • Entry of tolerances • Five coordinate systems can be stored • Touch-probe management for the various stylus shapes
Error compensation	• Linear, and segmented over up to 1000 points • Squareness calibration • Matrix compensation over up to 30 x 30 points
Data interface	• RS-232-C/V.24 • USB (type A)
Touch-probe connection*	HEIDENHAIN touch probe or Renishaw touch probe
Other connections	Foot switch for two functions
Accessories	Mounting base, foot switch, 3-D demo part, protective cover
Main power input	100 V~ to 240 V~ (–15 % to +10 %), 43 Hz to 63 Hz
Operating temperature	0 °C to 45 °C
Protection EN 60529	IP 00, front panel IP 40
Weight	*ND:* 1.6 kg; *Tilting base:* 3.2 kg

***** Please select when ordering
1) Depends on the signal period of the connected encoders as well as the subdivision factor

ND 1400 QUADRA-CHEK
– the Digital Readout for Manual 3-D Measuring Machines

G.E. Van Wert Co. Inc.
461 Boston St. Topsfiled MA. 01983
(978)887-3389 gevanwert.com

The ND 1400 QUADRA-CHEK digital readout supports four axes: in addition to the linear axes XYZ it features an auxiliary axis Q solely for angular display. The readout is designed specifically for manual coordinate measuring machines, and can capture two- and three-dimensional features with its measuring computer functionality.

Description
The ND 1400 digital readout is characterized by the large, color touchscreen. Its enclosure consists of robust, diecast aluminum.

Functions
The innovative operator guidance provides self-explanatory information about the various functions. It already supports you while setting up the coordinate system (ascertaining the reference plane, aligning the part and specifying the datum).

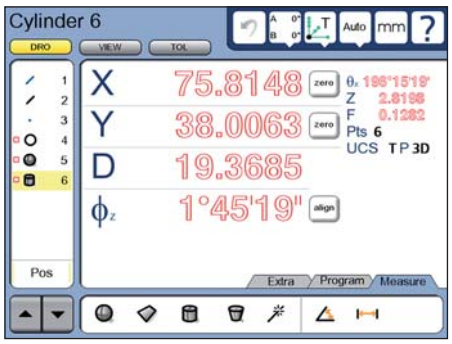
Predefined features (point, line, circle, slot, rectangle, plane, cylinder, cone, sphere) are available for measurement. The "Measure Magic" function makes measurement especially easy: it selects that feature which best matches the shape implied by the points probed. In addition, you can establish relationships (distances, angles) between all features.

You can create or automatically record measuring programs for repeated parts. The digital readout graphically takes you to the next measurement position during program run.

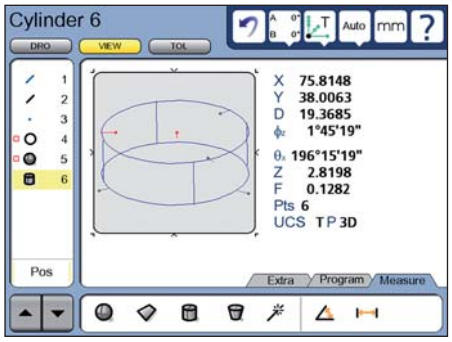
You can also use the ND 1400 to measure 3-D features, such as surfaces, cylinders, cones, etc. The measurement points are probed with a touch probe. If a triggering touch probe is used the values are saved automatically. With rigid probing elements a key must be pressed.
The measured features can be clearly displayed either in three dimensions or in one of the three projection planes.

Data interfaces
You use the data interfaces to output measurement points as well as to read and transmit settings, compensation values and programs. The RS-232-C/V.24 serial interface enables communication with a PC. You can connect printers or memory media to the USB port.

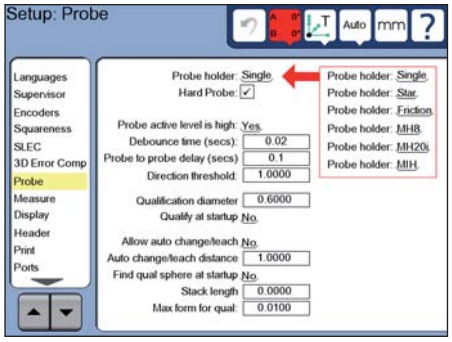
Clearly structured display
The large, color, flat-panel touchscreen enables simple operation with intuitive operator guidance, since in each mode only those functions actually available are offered for selection. The numeric keypad and the few basic function keys are located in ergonomically favorable positions.



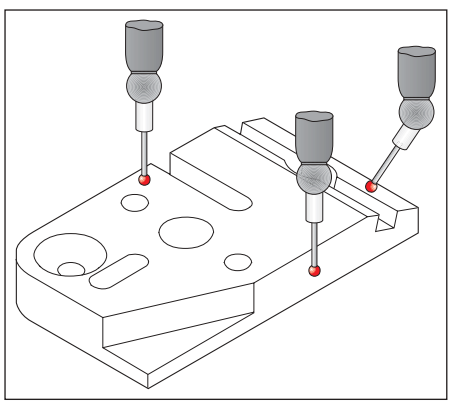
Measuring 3-D contours
In addition to the flat geometric features, such as points, lines, circles, etc., you can also use the ND 1400 to measure 3-D shapes, e.g. cylinders or cones. The screen displays the feature in three dimensions. Colored highlighting of each measurement point lets you identify form errors and any filtered measured values at a glance. The ND 1400 also permits 3-D position and form tolerances, such as flatness and parallelism.



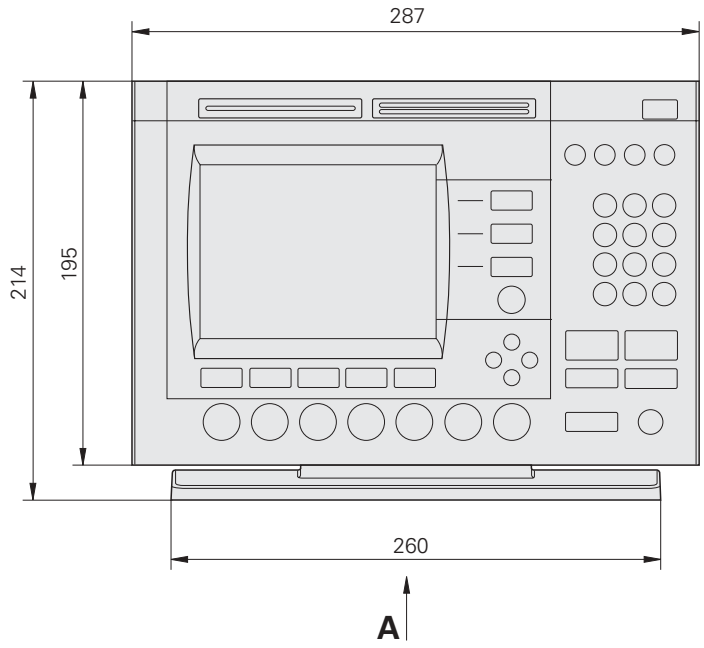
Working with the touch probe
The ND 1400 also supports you optimally while working with touch probes. You can instantaneously call commercial probing elements (normal stylus, star stylus), as well as rigid and tiltable probing heads, all of which are managed in a library, via the touchscreen. During probing the ND automatically takes the direction of probing into account, as well as the length and diameter of the stylus. Even complex parts can be rapidly measured with the five available coordinate systems.

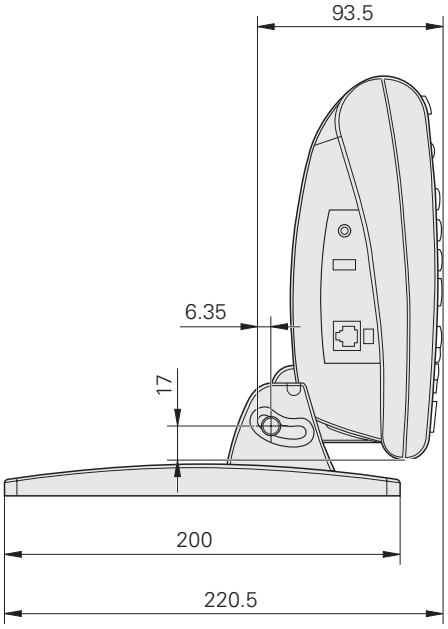


Saving of measurement points
The ND 1400 saves the measurement points via the touch probe of the coordinate measuring machine. A triggering 3-D touch probe is connected directly to the digital readout, and the measured value is transferred automatically. With a rigid probing element the measured value must be saved by pressing a key. You can use the comprehensive input menu to define numerous parameters.



Mounting
Dimensions of ND 1000/ND 2000





Dimensions in mm

Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm

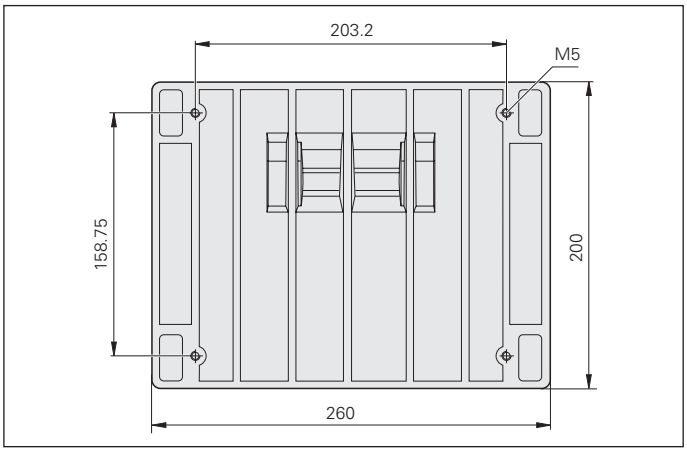
Mounting and Protection

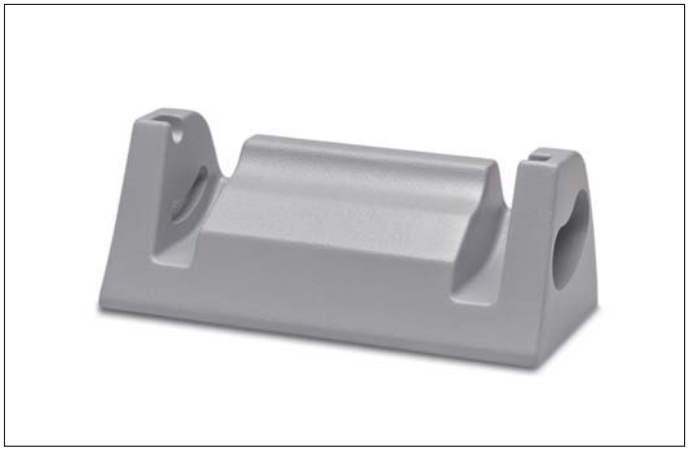
Mounting
The ND 1000 and ND 2000 display units were conceived as upright units. There are several possible mounting configurations:
- Tilting base
- Mounting base

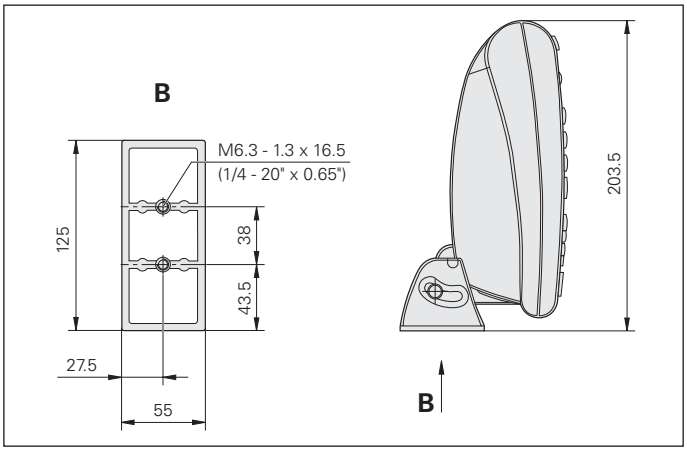
Tilting base
The tilting base is included in delivery. It can be used to tilt the display forward and backward by up to 20°. It can be attached with M5 screws.

Mounting base (accessory)
With the aid of a mounting base you can set up the ND 1000 and ND 2000 either on the machine or on a mounting arm.

ID 682419-01







Protective cover (accessory)
Protective covers are available accessories in order to protect the keyboard and screen of the ND 1000/ND 2000 from becoming soiled. The display can still be easily read through the transparent protective covers. They fit themselves optimally to the front of the unit, without impairing the ease of operation.

ND 11xx; 1/2 axes	ID 681051-02
ND 11xx; 3/4 axes	ID 681051-03
ND 12xx	ID 681051-01
ND 21xx	ID 681051-04

Interfaces
Digital Readouts

The digital readouts feature interfaces for encoders, for communication and for external components.

	ND 1102 ND 1103 ND 1104	ND 1202	ND 1203 ND 1204	ND 1302 ND 1303 ND 1304		ND 1404	ND 1202T	ND 2104G ND 2108G
Encoders	1 V_{PP} or TTL							
Touch probe	●[1]	–	–	–	–	●[1]	–	●[2]
Video	–	–	–	●[3]	–	–	–	–
Fiber-optic cable Optical edge detector	–	Option	Upon request	–	●	–	–	–
Data	RS-232-C/V.24 and USB type A							
Light control	–	–	–	Option	–	–	–	–
Zoom	–	–	–	Option	–	–	–	–
CNC outputs	–	–	–	Option	Option	–	–	–
Foot switch	●	●	●	●	●	●	●	●
Remote keypad	●	●	●	●	●	–	●	●
Switching outputs	–	–	–	–	–	–	–	12 TTL
Switching inputs	–	–	–	–	–	–	–	5 TTL

● = Available
– = Not available
1) HEIDENHAIN touch probe or Renishaw touch probe
2) Connection for two relay outputs or HEIDENHAIN touch probe or Renishaw touch probe
3) S-Video and composite

IK 5000

Connections to the IK 5000 are made via its D-sub connectors. Depending on the version, further connections are made through one or two additional slot covers.

		IK 5293	IK 5294	IK 5394-EG	IK 5394-2D	IK 5493	IK 5494-2D	IK 5494-3D	IK 5594
	Slots[1]	*2*	*2*	*2*	*3*	*3*	*3*	*3*	*3*
	Location								
Encoders for X, Y, Z	*IK*	1 V_{PP} or TTL							
CNC outputs	*IK*	–	–	–	–	●	●	●	●
Foot switch	*IK*	●	●	●	●	●	●	●	●
Fiber-optic cable	*Slot L*	–	–	●[2]	–	●[2]	–	–	–
Touch probe	*Slot 1*	●[3]	–	–	–	–	–	●[3]	TP 200
Light control	*Slot 1*	–	–	–	●	–	●	●	●
Zoom	*Slot 2*	–	–	–	●	–	●	●	●
Encoder for Q axis	*Slot 2*	–	1 V_{PP} or TTL						
Video	*PC*	–	–	–	USB camera[4]	–	USB camera[4]	USB camera[4]	USB camera[4]

● = Available
– = Not available
[1] Including IK
[2] Connected directly to the IK PCB, special slot cover with cable guide included in delivery
[3] HEIDENHAIN touch probe or Renishaw touch probe
[4] Connected to the USB port of the PC

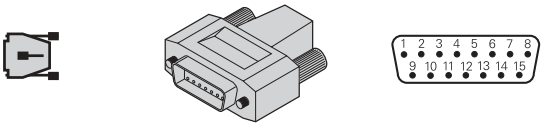
Please order the adapter cables necessary between the individual components separately.

Interfaces
Encoders

Depending on the versions, the digital readouts and the PC board are designed for encoders with 1 V_{PP} or TTL interface. Other interfaces are available upon request. A distribution cable is necessary in order to attach the encoders to the IK 5000.

Pin layout ∿ 1 V_{PP}

Mating connector:
15-pin D-sub connector (male)

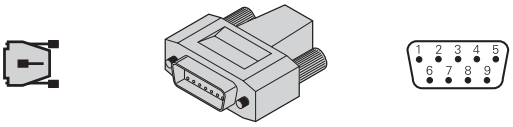


	Power supply				Incremental signals						Others
	4	**12**	**2**	**10**	**1**	**9**	**3**	**11**	**14**	**7**	**5/6/8/ 13/15**
∿ 1 V_{PP}	**U_P**	**Sensor** U_P	**0 V**	**Sensor** 0 V	**A+**	**A–**	**B+**	**B–**	**R+**	**R–**	**/**

Shield on housing; **U_P** = Power supply voltage
Sensor: The sensor line is connected in the encoder with the corresponding power line.
Vacant pins or wires must not be used!

Pin layout ⊓⊔ TTL

Mating connector:
9-pin D-sub connector (male)



	Power supply			Incremental signals					
	7	**6**	**1**	**2**	**3**	**4**	**5**	**8**	**9**
⊓⊔ TTL	**U_P**	**0 V**	**0 V**	**U_{a1}**	**$\overline{U_{a1}}$**	**U_{a2}**	**$\overline{U_{a2}}$**	**U_{a0}**	**$\overline{U_{a0}}$**

Shield on housing; **U_P** = Power supply voltage
Vacant pins or wires must not be used!