Nixdorf 8890 Series

MANAGEMENT SUMMARY

The Nixdorf 8890 plug-compatible system comprises four models, the Model 10, Model 30, Model 50, and Model 70. The same basic architecture is used throughout the system, and any model can be field-upgraded to the most powerful configuration. The 8890 is a medium-sized mainframe intended for commercial applications. It offers batch processing and on-line facilities.

The 8890 central processors are manufactured by Nixdorf under license from Elbit Computers of Israel who designed the mainframe.

Nixdorf Computer AG designs and manufactures mainframes, minicomputers including fault-tolerant systems, microcomputers, office systems, banking terminals, and data communications equipment including digital PABXs and an IBM-compatible display workstation system. Nixdorf produces the 8870 minicomputer system which runs the same applications software as the more powerful 8890 mainframe system.

In 1983, Nixdorf's total revenue increased by 19 percent to DM 2.700 million, of which Germany provided 49 percent and international markets accounted for 51 percent. Nixdorf employs approximately 18,600 people worldwide and has 40 subsidiary companies. The subsidiaries operate independently in that each has its own marketing strategy, and provides customer support and training. The 8890 system is marketed in Australia, Austria, Belgium, France, Israel, Italy, Netherlands, Scandinavia, South Africa, Spain, Switzerland, United Kingdom, USA, and West Germany. ▷

The Nixdorf 8890 Series is a family of plug-compatible medium-sized mainframes which provides standalone and distributed processing power. The members of the series are upgradeable on-site.

MODELS: 8890 Models 10, 30, 50, and 70.
CONFIGURATION: From 1MB to 8MB main memory; 516MB to over 15GB disk storage; and a maximum of 144 workstations. The top-end model supports 24 communications lines.
COMPETITION: IBM 4300 Series.
PRICE: Purchase price for central processor plus main memory ranges from approximately DM 119.000 to DM 325.000.

CHARACTERISTICS

MANUFACTURER: Nixdorf Computer AG, Fürstenallee 7, 4790 Paderborn, West Germany. Telephone (05251) 3010. Telex 936791.

Nixdorf Computer AG, Leopoldstr. 208, D-8000 Munich 40. Telephone (089) 360 9100. Telex 5216447.

COMPANY LOCATIONS: *Australia:* Nixdorf Computer Pty. Ltd., 655 Pacific Highway, P.O. Box 235, St. Leonards N.S.W. 2065. Telephone (02) 439 5477. *Austria:* Nixdorf Computer GmbH., Untere Donaustr. 11, 1020 Vienna. Telephone (0222) 266767. *Belgium:* Nixdorf Computer SA, Rue Colonel Bourg 105, 1040 Brussels. Telephone (02) 735 8050. *Canada:* Nixdorf Computer Canada Ltd., 505 Consumers Rd., Suite 102, Willowdale, Ontario M2j 4V8. ▶
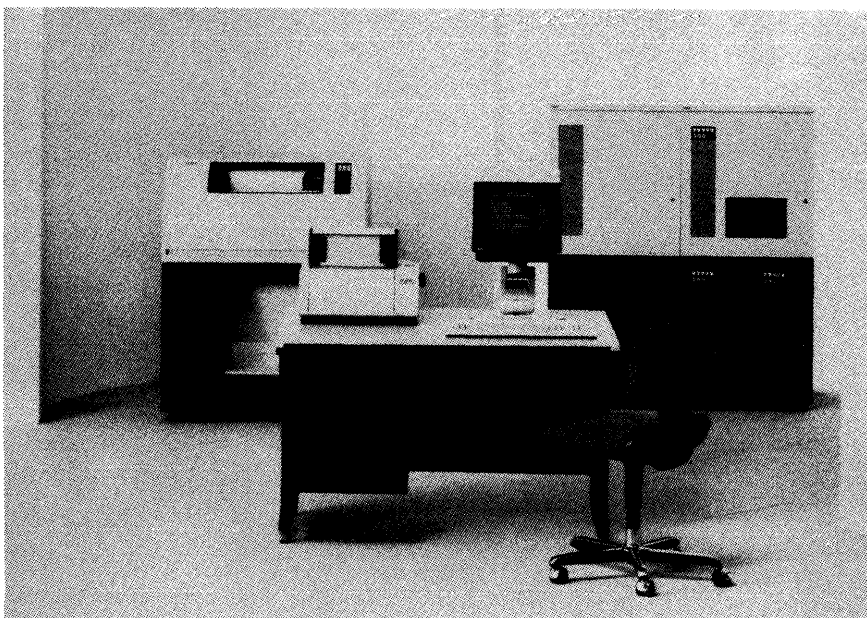
The top-end 8890 Model 70 has from 2MB to 8MB of main memory and can support 24 disk drives. The configuration shown contains a system printer and a workstation on the optional turntable. All 8890 models can be upgraded to the Model 70.

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▷ The basic architecture of the 8890 comprises a central bus to which the central processor, main memory, and input/output system are attached. The I/O system consists of a number of bus managers connected to both the central bus and the I/O buses, and dedicated I/O controllers attached to the I/O buses. The I/O controllers support peripherals such as disk units, workstations, printers, and card readers.

Nixdorf supplies workstations, disk and magnetic tape units, and slow-speed peripherals, but the 8890 can also support products from a number of major peripheral vendors such as BASF, CDC, IBM, Memorex, and STC. The 8890 supports industry-standard IBM operating systems, including DOS/VSE, DOS/VS, VM/370, and VM/SP, and can also run under NIDOS/VSE, a Nixdorf-supplied operating system compatible with DOS/VSE.

PROCESSORS AND PERIPHERALS

Each model comprises the basic central processing unit, while Models 50 and 70 contain additional central processor hardware to increase system performance. Model 50 performs almost twice as fast as Model 30, while the performance of Model 70 is almost three times that of Model 30.

Main memory extends from a minimum of 1M byte to a maximum of 8M bytes in increments of 1M byte and 2M bytes. From 2 to 24 disk drives can be connected to the system, giving a total storage capacity of 15.24G bytes. Peripherals are connected into the system through integrated peripheral adaptors, a number of which are supported by an input/output controller. Each I/O controller can be specified to operate in either block multiplexer or byte multiplexer mode, depending on the type of peripherals attached. All 8890 models can support up to eight I/O controllers. The ability to connect a greater number of peripherals, other than via the peripheral adaptors, is provided by optional block multiplexer and byte multiplexer channels, where an I/O controller can support either type of channel interface.

Fixed and exchangeable disk drives ranging in capacity from 100M to 635M bytes are available with the 8890 system. The three models of fixed disk use Winchester-type technology and can store 100M, 129M, or 635M bytes of data respectively, while the exchangeable disk drive has a capacity of 200M bytes. A diskette with a capacity of 256K bytes, containing diagnostics software, is standard with each model. A second diskette drive, and magnetic tape drives providing backup storage can be connected to the system.

The Model 10 can support up to 16 workstations and 16 printers, while a maximum of 144 workstations and printers can be connected to Models 30, 50, and 70. Additionally, one or two system printers can be included in a configuration.

The Nixdorf workstation displays amber characters on a brown background, has an antiglare screen, and contains a separate low-profile keyboard which is available in a num- ▷

▶ Telephone (416) 498 7200. *Denmark:* Nixdorf Computer A/S, Hoerkaer 20, DK-2730 Herlev. Telephone (02) 919810. *Eire:* Nixdorf Computer Ltd., Fitzwilliam Court, Leeson Close, Dublin 2. Telephone (01) 767551. *Finland:* Oy Nixdorf Computer AB, Höyläämötie 11, 00380 Helsinki 38. Telephone (0) 558072. *France:* Nixdorf Computer SA, 7-13 Bd. de Courbevoie, 92200 Neuilly-sur-Seine. Telephone (01) 747 1270. *Greece:* Nixdorf Computer A.E., Leof-Sygrou + Skra 1, Athen-Kallithea. Telephone (01) 959 5190. *Hong Kong:* Nixdorf Computer Ltd., Unit A, 9th Floor United Centre, 95 Queensway, Central, Hong Kong. Telephone (05) 202222. *Italy:* Nixdorf Computer SpA, Via Piranesi 46, 20137 Milan. Telephone (02) 73961. *Japan:* Nixdorf Computer Japan, 5-23, Higashi-Gotanda 5-Chome, Shinagawa-Ku, Tokyo 141. Telephone (03) 443 0504. *Luxembourg:* Nixdorf Computer S.A., 107-111 route d'Arlon, 8009 Strassen. Telephone 312828. *Morocco:* Nixdorf Computer S.A., 23 Bd. Girardot, Casablanca. Telephone 307639. *Netherlands:* Nixdorf Computer BV, Postbus 29, Mijlweg 7-9, 4130 EA Vianen. Telephone (0347) 372904. *Norway:* Nixdorf Computer A/S, Postbox 59 Lilleaker, Lilleakerveien 25, Oslo 2. Telephone (02) 553190. *Singapore:* Nixdorf Computer Pte. Ltd., 100-c Pasir Panjang Rd., Singapore 0511. Telephone 4791100. *South Africa:* Nixdorf Computer Pte. Ltd., Triompf House, Stanley Av., Milpark, P.O. Box 7911, Johannesburg 2092. Telephone (011) 7268 6000. *Spain:* Nixdorf Computer S.A., Capitán Haya 38, Madrid 20. Telephone (01) 279 7808. *Sweden:* Nixdorf Computer AB, Dalvägen 22, S-17136 Solna. Telephone (08) 730 0600. *Switzerland:* Nixdorf Computer AG, Obstgartenstr. 25, 8302 Kloten. Telephone (01) 814 3434. *United Kingdom:* Nixdorf Computer Ltd., 125-135 Staines Rd., Hounslow, Middlesex TW3 1JB. Telephone (01) 570 1888. *USA:* Nixdorf Computer Corporation, 168 Middlesex Turnpike, Burlington, MA 01803. Telephone (617) 273 0480.

DISTRIBUTORS: Nixdorf is represented by agencies in the following countries: Argentina, Brazil, Egypt, Israel, Korea, New Zealand, Peru, Portugal, Sri Lanka, Thailand, Turkey, Venezuela, Yugoslavia, and Zimbabwe.

MODELS: 8890 Models 10, 30, 50, and 70.

DATE ANNOUNCED: Model 10: February 1983; Models 30 and 50: September 1980; Model 70: September 1981.

DATE OF FIRST DELIVERY: Model 10—Mid-1983; Models 30 and 50—July 1981; Model 70—October 1983.

NUMBER INSTALLED TO DATE: Approximately 400.

DATA FORMATS

BASIC UNITS: 8-bit byte; 32-bit word.

FIXED-POINT OPERANDS: 16-, 32-, and 64-bit operands are used.

FLOATING POINT OPERANDS: There are four 64-bit floating point registers which can be combined to provide two 128-bit registers for extended floating point arithmetics.

INSTRUCTIONS: 2, 4, and 6 bytes long.

INTERNAL CODE: ASCII.

MAIN STORAGE

TYPE: MOS.

CYCLE TIME: 200 ns.

CAPACITY: Model 10—1MB; Model 30—1MB or 2MB; Model 50—2MB to 4MB in increments of 1MB; Model 70—2MB to 8MB in increments of 2MB. ▶

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TABLE 1. SYSTEM CHARACTERISTICS

	Model 10	Model 30	Model 50	Model 70
Main memory (MB)				
Minimum	1	1	2	2
Maximum	1	2	4	8
Cache memory (KB)	No	No	No	64
No. of disk drives	2-4	2-8	2-16	2-24
Max. disk capacity (MB)	516	5080	10,160	15,240
No. of diskettes	1	1	1	1
No. of magnetic tapes	1-2	1-4	1-8	1-12
Maximum no. of workstations	16 (+16 printers)	144 (incl. printers)	144 (incl. printers)	144 (incl. printers)
System printers	1	1-2	1-2	1-2
Card readers	No	1	1	1
Communications lines	4	4-8	4-16	4-24
No. of channels				
Byte multiplexer	No	1	2	2
Block multiplexer	No	1	1	3

▷ ber of different designs for functions such as typing and data entry. A turntable is an optional feature and enables the user to tilt and rotate the display. There are three models of workstation printer with speeds ranging from 100 characters per second to 300 lines per minute.

Three models of system printers with speeds of 300, 600, and 1200 lines per minute can be connected to the 8890 Models 30, 50, and 70; Model 10 cannot support the 1200-lpm printer. Some peripheral compatibility is offered between the Nixdorf 8870 minicomputer and the 8890 system. Workstations and printers can be used by both systems, although one board in the workstation and printer must be changed. Also, different keyboards are required by each machine, depending on the application. A card reader operating at 600 cards per minute can be used with Models 30, 50, and 70.

Between 4 and 24 communications lines are supported by the 8890. The lines are connected into the system through an integrated communications adaptor in the I/O controller.

SOFTWARE

The main operating system is NIDOS/VSE (Nixdorf Disk Operating System/Virtual Storage Extended) which is compatible with DOS/VSE and can support IBM software programs. All IBM/370-compatible programming languages, such as Assembler, Cobol, Fortran, RPG II, and PL/1 can run under NIDOS/VSE.

Nixdorf also provides the VM/ESX operating system, but this is presently only intended for converting Nixdorf 8870 software to the 8890. The Business Basic language is available under both the 8870 NIROS operating system and VM/ESX. It provides source program compatibility between the two systems. Intended software developments ▷

▶ CHECKING: Seven Error Correction Control (ECC) bits are provided for each word, enabling 1-bit errors to be corrected and 2-bit errors to be detected.

STORAGE PROTECTION: Main memory is divided into blocks of 2KB. Each block contains a storage protection key which must correspond to the storage key of an application program before the application program can access the memory block. A motor generator which provides power to the system for up to 1000 hours is optionally available.

CENTRAL PROCESSOR

GENERAL: A central bus connects the CPU, main memory, and the input/output bus managers. It is 36 bits wide including 4 bits for parity checking, and has a data transfer rate of 9MB per second.

The 32-bit Nixdorf 8890 CPU comprises control storage and an instruction processing unit in all models, an instruction preprocessing unit in Models 50 and 70, and 64KB of cache memory in Model 70. The instruction preprocessing unit reads and analyzes the next instruction while the processing unit is executing the current one. In Models 10 and 30, all instruction stages are performed by the instruction processing unit and the inclusion of the preprocessing unit in the two larger models approximately doubles the throughput of the CPU. The CPU also contains a time-of-day clock, a clock comparator, a CPU timer and a monitor feature which is used for program testing.

All models contain a service processor through which the system diskette, central operator console, and remote maintenance console are attached to the system. The service processor automatically tests the CPU at system startup, and if an error occurs, it initiates diagnostics software contained in the system diskette. Hardware errors are indicated by a light on the front of the cabinet. The service processor can also be used to notify the operator if overheating occurs in the system.

CONTROL STORAGE: The capacity of the control storage is 80KB and can be expanded to a maximum of 256KB. Control storage contains microcodes for the implementation of the System/370 Universal Instruction Set and for work- ▶

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TABLE 2. PERIPHERALS TABLE

DEVICE	DESCRIPTION
Display Terminal	
Model 4	1920 chars; 24 lines x 80 chars. generated in 7 x 9 dot matrix; 2 additional lines for error messages, instructions; amber chars. on brown background; 12-inch screen; 96-char. EBCDIC set including upper- and lowercase, digits, special chars.; national sets including Danish/Norwegian, German, English (U.S.), English (U.K.), French, Italian, Swedish/Finnish, and Spanish; detachable typewriter, data entry or programming keyboard; typewriter: 12 programmable function keys, separate numeric keypad, upper- and lowercase; data entry: 8 programmable function keys, separate numeric keypad, upper case; programming: 24 programmable function keys, upper- and lowercase.
Printers	
100 cps	Workstation matrix printer; 100 cps; 80 columns.
100 cps	Workstation matrix printer; 100 cps; 132 columns.
300 lpm	Workstation matrix printer; 300 lpm; 132 columns.
300 lpm	System steel belt printer; 360/300/230 lpm; 48/64/96 char. set; 132 columns; normal and script type faces.
600 lpm	System steel belt printer; 720/600/440 lpm; 48/64/96 char. set; 132 columns; normal and script type faces.
1200 lpm	System chain printer; 1500/1200 lpm; 48/64 char. set; 136 columns.
Magnetic Tape Units	
40/160KB unit	1600 bpi; 12.5/100 ips; start, stop/streaming tape mode; 40/160KB per second; 46MB capacity.
120KB unit	800/1600 bpi; 75 ips; 120KB per second; 46MB capacity.
120/470KB unit	1600/6250 bpi; 75 ips; 120/470KB per second; 180MB capacity.
160KB unit	3200 bpi; 50 ips; 160KB per second; 92MB capacity.
470KB unit	1600/6250 bpi; 75 ips; 470KB per second; 180MB capacity.
Card Reader	600 cards/min; 80-column cards; feed and stack capacity of 1000 cards.

▷ include a major new release for NIDOS/VSE which will contain timesharing options and make VM/ESX a more general-purpose operating system.

Subsidiaries in each country market software developed by Nixdorf or software houses specifically for that country. Therefore, in different countries, common applications packages will be available, but vary in their individual programs. Such applications include banking, manufacturing and finance. A popular international package is COMET, an accounting and finance system which can be modified to suit an individual's needs. It is available in different languages, and national versions which take account of local legal and financial requirements. COMET originated as an 8870 package and runs under the VM/ESX operating system. Software is available which enables the 8890 to act as the central processor in a videotex network.

Nixdorf is currently implementing the ECMA Standard for Open Systems Local Area Networking (OSLAN) on the 8890 system. Other major computer manufacturers supporting this standard include Bull, DEC, Ericsson, Fujitsu, Hewlett-Packard, ICL, Intel, Logica, Olivetti, Siemens, 3 Com, and Xerox.

The Nixdorf 8890 is sold as an unbundled system. The user pays for hardware, software, support and training, separately. Basic documentation is supplied with both hardware and software. ▷

▶ station diagnostics support, and routines for testing the CPU, main memory, and input/output system.

REGISTERS: There are sixteen 32-bit general purpose registers for use as base and index registers, and accumulators. These can be linked to form eight 64-bit registers. There are also sixteen 32-bit control registers which provide additional information for system control.

ADDRESSING: There are three basic addressing modes.

INSTRUCTION REPERTOIRE: The Nixdorf 8890 instruction set supports the System/370 Universal Instruction Set with the exception of four multiprocessor instructions and two direct control instructions. The instruction set includes 19 system control instructions, 8 I/O instructions, 90 standard instructions (such as arithmetic, logical, and shift), 9 decimal instructions, 44 floating point instructions, and 7 extended floating point instructions.

PHYSICAL SPECIFICATIONS: Model 10 measures 140 by 160 by 70 cm³ (height by width by depth) and weighs approximately 520 kg. Model 30 measures 140 by 120 by 70 cm³ and weighs 350 kg. Model 50 and Model 70 have the same dimensions: 140 by 180 by 70 cm³. Model 50 weighs 525 kg, and Model 70 weighs 600 kg.

INPUT/OUTPUT CONTROL

Three I/O buses are attached to the Nixdorf 8890 central bus through I/O bus managers. Each I/O bus is 32 bits wide and operates at a data transfer rate of 7MB per second. Between one and three I/O controllers are connected to each I/O bus, but the total number of I/O controllers in a system ▶

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Integrated Adaptor Table

	8890/10	8890/30	8890/50	8890/70
Disk Adaptor (4 disks/adaptor)	1	2	4	6
Magnetic Tape Adaptor (4 tapes/adaptor)	1	1	2	3
Printer and Card Reader Adaptor (2 printers, 1 card reader/adaptor)	1	1	1	1
Diskette Adaptor (1 diskette/adaptor)	1	1	1	1
Communications Adaptor (V.24) (4 lines/adaptor)	1	2	4	6
Automatic Calling Equipment Adaptor (V.25) (4 lines/adaptor)	1	1	1	1
Display Terminal Adaptor (8 terminals/adaptor)	2	12	12	12

▷ COMPETITIVE POSITION

The Nixdorf 8890 competes with the lower-end models in the IBM 4300 Series. The 4321 has a performance level below that of the 8890 Model 10, while the 4341 Model Group 10 and the 8890 Model 70 have similar performance levels. The IBM 4331 Model Group 11, the 4331 Model Group 2, and the 4341 Model Group 9 fall between Models 10 and 70 of the Nixdorf 8890 series. Other competitors include the Siemens 7.500 Series, the BASF 7/7X, the Burroughs B5900, and the NCR V-8500 and V-8600 Systems.

ADVANTAGES AND RESTRICTIONS

While the Nixdorf 8890 is a plug-compatible system, Nixdorf does not emphasize this feature of its mainframe as is perhaps shown by the fact that over 90 percent of the customers use only Nixdorf equipment. This could prove an advantage for users, as Nixdorf can provide all hardware, software, and maintenance requirements to eliminate the need for the user to deal with several companies. Also, all models can be upgraded on-site to the most powerful configuration. This is another distinct advantage for users whose requirements are likely to increase.

USER REACTION

The 1983 Datapro Survey of German Users of Computer Systems brought responses from seven Nixdorf 8890 users. The average life of the system was 18.1 months. Two systems were purchased, four were rented from Nixdorf, and one was leased from a third party. Major applications areas included accounting/billing, order processing/inventory control, payroll/personnel, manufacturing, insurance, purchasing, and sales distribution. All systems supported both local and remote workstations, and ran Nixdorf's communications package.

Significant advantages cited by users included a good response time, easy expansion/reconfiguration of the system, ▷

▶ cannot exceed eight. An I/O controller contains a 16-bit microprocessor and can work in either byte multiplexer or block multiplexer mode. It supports integrated adaptors through which peripherals and communications lines are connected into the system.

In byte multiplexer mode, an I/O controller supports integrated adaptors for slow peripherals such as line printers, card readers, diskettes, and magnetic tapes with a transfer rate of less than 160KB per second. The controller can also support a byte multiplexer channel interface with a maximum data rate of 140KB per second, and an integrated communications adaptor.

In block multiplexer mode, an I/O controller supports integrated adaptors for high-speed peripherals such as disk drives, magnetic tapes with a transfer rate of up to 470KB per second, and display terminals, or can provide a block multiplexer channel interface. The maximum data rate of the block multiplexer channel is 1.5MB per second.

CONFIGURATION RULES

The Nixdorf 8890 Model 10 comprises the basic CPU, 1MB of main memory, two fixed disk drives with capacities of 100MB or 129MB, the integrated system diskette, a user diskette, one magnetic tape unit, up to sixteen workstations and/or printers, and one system printer. Disk capacity can be increased to 516MB with an additional two fixed disks, and a second magnetic tape unit can be added to the system. The Model 10 supports four communications lines.

The Model 30 contains the basic CPU, 1MB of main memory, two fixed disk drives, the system diskette, one user diskette, one magnetic tape unit, and one system printer. Expansion possibilities include increasing main memory capacity to 2MB, increasing magnetic tape capacity to four units, the addition of six more fixed or exchangeable disk drives to a total capacity of 5GB, a second system printer and one card reader, and support for up to 144 workstations and printers. One byte multiplexer and one block multiplexer channel can be connected to the Model 30, which also supports from four to eight communications lines.

The Model 50 includes the basic CPU with an additional instruction preprocessing unit (IPU) and between 2MB and 4MB of main memory. Disk capacity ranges from 200MB on two disks up to 10GB on sixteen disks. Mass storage on the Model 50 also includes one system diskette, one user diskette, and magnetic tapes to a maximum of eight units. The system can support 144 workstations and printers, two ▶

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▷ and compatibility, as promised by Nixdorf, of software carried over from other systems. The major problem was late installation of equipment.

To the question "Did the system do what you expected it to do?", five users said "Yes," one user said "No," and one user was undecided. When asked if they would recommend the system to another user, five users would, one user would not, and one user was undecided.

Users were asked to evaluate the different aspects of their systems under the headings Excellent, Good, Fair, and Poor. The weighted average obtained is based on a scale of 4.0 for Excellent. The system ratings are summarized in the following table.

	Weighted Average
Ease of Operation	2.60
Reliability of Mainframe	3.50
Reliability of Peripherals	3.17
Maintenance Service:	
Responsiveness	2.33
Effectiveness	2.83
Technical Support:	
Troubleshooting	2.50
Education	2.29
Documentation	2.29
Manufacturer's Software:	
Operating System	3.00
Compilers & Assemblers	2.80
Applications Programs	2.33
Ease of Programming	2.33
Ease of Conversion	2.25
Overall Satisfaction	2.71 □

▶ system printers, one card reader, two byte multiplexer channels, and one block multiplexer channel. Communications facilities include from four to sixteen lines.

Model 70 is the most powerful system in the 8890 Series. The basic configuration comprises a CPU with IPU and 64KB of cache memory, 2MB of main memory, two disk drives, one system diskette, one user diskette, one magnetic tape unit, one system printer, and one card reader. Main memory can be expanded to 8MB. Another 22 fixed or exchangeable disk drives can be added to the system giving a maximum disk capacity of 15.24GB, and twelve magnetic tape units can be supported. Model 70 can support 144 workstations, two system printers, and two-byte and three-block multiplexer channels. From 4 to 24 communications lines can be attached to the system.

MASS STORAGE

The user diskette is connected into the system through the integrated diskette adaptor which supports up to four fixed or exchangeable disk drives.

DISKETTE DRIVE: This diskette drive is IBM 3741-compatible and has a capacity of 243KB. Average access time is 91 ms and the data transfer rate is 31KB per second. The drive can be connected to all Nixdorf 8890 models.

FIXED DISK DRIVES

100MB Disk Unit: Average access time is 27 ms and the data transfer rate is 675KB per second. It is available with all models.

129MB Disk Unit: Average access time is 27 ms and the data transfer rate is 675KB per second. It is available with all models.

635MB Disk Unit: Uses two disks. Average access time is 23 ms and the data transfer rate is 1.2MB per second. It is available with Models 30, 50, and 70.

EXCHANGEABLE DISK DRIVE

200MB Disk Unit: Average access time is 28.5 ms and the data transfer rate is 806KB per second. It is available with Models 30, 50, and 70.

INPUT/OUTPUT UNITS: See Peripherals Table.

Workstation display units are attached to an 8890 through the integrated display terminal adaptor which supports eight terminals. The integrated tape adaptor can control four magnetic tape units, and the integrated printer and card reader adaptor supports two system printers and one card reader.

COMMUNICATIONS CONTROL

The 8890 system can support both local and remote workstations. Local terminals can be sited at a maximum distance of 2000 meters from the central cabinet. Remote terminals are connected through an RS-232-C/V.24 interface.

The integrated communications adaptor provides four V.24 interfaces for BSC and SDLC connections, while the integrated automatic calling equipment (ACE) adaptor provides four V.25 ports. Both adaptors connect into an I/O controller.

SOFTWARE

OPERATING SYSTEM: NIDOS/VSE (Nixdorf Disk Operating System/Virtual Storage Extended) is a modular operating system which contains three main components: control programs, processing programs, and data management routines. The control programs consist of the Initial Program Loader (IPL), the supervisor, and the job control program. The processing programs are initiated by the job control program and include utilities, compilers, and application programs. The data management routines enable the user to access external disk storage connected through the block multiplexer channel, and provide security features.

NIDOS/VSE, as the name suggests, supports virtual memory storage and can contain up to twelve virtual and real memory partitions. The operating system can run in either the System/370 mode or the ECPS/VSE (Extended Control Program Support/Virtual Storage Extended) mode. The ECPS/VSE mode provides increased performance by operating directly on virtual addresses. The System/370 mode is available from Release 1 of NIDOS/VSE onwards, and the ECPS/VSE mode is supported by Release 2 onwards.

Release 2 also offers the following extensions to the operating system:

• Data Entry Control System—provides data entry and verification facilities;

• Extended Control Facility—provides control of workstations from the central console;

• Extended Spooling Facility;

• Extended Remote Job Entry—for remote access of IBM 2780/3780/3740 devices;

• Program Development and Maintenance System;

• Tape Management System/VSE—controls magnetic tape files. ▶

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Nixdorf also offers the VM/ESX (Virtual Machine/Extended Systems Executive) operating system with the 8890 Series. VM/ESX is currently offered for users who wish to convert software running on the Nixdorf 8870 minicomputer series to run on the 8890 models. Nixdorf is developing VM/ESX on the 8890 and intends that it should become a more general-purpose operating system.

IBM operating systems supported by the 8890 include DOS/VSE, DOS/VS, VM/370, and VM/SP.

LANGUAGES: Languages offered by Nixdorf under NI-DOS/VSE are Basic, Cobol and RPG II. All other IBM/370-compatible languages are also supported. Under VM/ESX, Basic and Cobol are supported.

- Basic—A Basic compiler and runtime system are available. Business Basic programs written for the 8870 can be transferred to the 8890.

- Cobol—The Cobol compiler supports the ANSI 1974 standard.

COMMUNICATIONS SOFTWARE: Protocols supported by the 8890 include SNA/SDLC and BSC. The 3270 Multi-Host facility is also available.

UTILITIES

Document: This aids users in the generation and formatting of documents.

Job Accounting: Job accounting information is automatically written to a job accounting file when a job is completed. This information can be analyzed by the user.

Nixdorf File Utility: This contains functions which aid the user in maintaining, updating, copying, and printing disk and magnetic tape files.

DATA BASE

Nixdorf Data Base System (NDB) is a relational data management system which offers reentrant code and multithreading facilities. A user can access a maximum of 240 data bases with 240 files per data base; each file contains up to 31 keys with which the user can search data. A data query language offering fast data retrieval and a dictionary holding all stored data are optionally available.

APPLICATIONS SOFTWARE

COMET: A software package developed by Nixdorf to run under VM/ESX on all models in the 8890 Series, COMET covers a wide range of accounting and financial applications, and includes word processing. It contains a Help facility and provides graphics features. In addition to the main modules detailed below, COMET contains additional modules which aid report writing and file enquiry.

Cost Accounting: Cost center accounting, job order costing, cost objective accounting, flexible and fixed standard costing, actual costing;

Financial Accounting: Sales, purchase and general ledgers, automatic payments, draft management;

Fixed Asset Accounting: Calculation of depreciation, forecasting;

Order Processing and Invoicing: Incoming orders, pricing and discounting, deliveries, invoicing, reports;

Payroll: Gross and net pay, reports;

Production Control: Material billing and control, routing, capacity planning, cost estimation;

Purchase Order Processing: Supplier selection, purchasing, order monitoring, invoicing;

Stock Control: Stock keeping, valuation and monitoring, ordering, stock taking;

Word Processing: Data and text processing are integrated. While working in one file, a user can access data from another.

COMET is available in international versions which operate with different languages, currencies, and legal and financial requirements.

CHICO: (Checklist-Input Customized Output) is intended for use with COMET and helps users initially select the correct COMET modules. CHICO then questions the user to determine individual requirements and parameters, and structures the model accordingly.

A large number of software packages running on the 8890 are available from Nixdorf national subsidiaries and software houses. The choice of packages differs between countries, but the same range of applications is covered. These packages include financial accounting, financial planning, personnel accounting, cost accounting, investment and book keeping, sales processing, purchasing, stock control, material control, production control, project planning, and word processing.

SERVICE AND SUPPORT DIAGNOSTICS

Nixdorf offers a remote diagnostic facility by which an 8890 system can be connected through an acoustic coupler to a remote maintenance console in a Nixdorf business office. A Nixdorf engineer can then run diagnostic programs to aid the user in identifying the fault.

MAINTENANCE

The basic maintenance contract offers software support in normal office hours (8 a.m. to 5 p.m.) and 24-hour hardware support. After installation, Nixdorf will provide support and advice concerning new applications, optimization of solutions, and upgrading possibilities.

TRAINING: Nixdorf runs training courses in branch offices in each country, and in-house where practical. Training courses for the 8890 system must be paid for by the user. Courses vary in length from three days to two weeks, and include operation and service of the 8890, and software training. Software courses cover installation, and introductory and comprehensive seminars on operating systems, programming languages, the data base system, and applications packages.

DOCUMENTATION: Nixdorf provides one set of general operating and software documentation free of charge with an 8890 system. A wide range of more detailed manuals for the 8890 can be purchased separately, covering topics such as operating system, language and applications software information, and CPU and peripheral information. Documentation is available in both German and English.

PRICING

The 8890 is sold unbundled, which means that the user pays for hardware, software and training separately. The following prices are in German marks, DM. Volume purchase discounts are available for workstations and printers as follows: 30 to 99 units—10 percent; 100 to 499 units—15 percent; 500 to 1999 units—20 percent; over 2000 units—30 percent.

Nixdorf 8890 Series

EQUIPMENT PRICING

	Purchase Price (DM)	Monthly Maint. (DM)	Monthly Lease* incl. Mainten- ance (DM)
Model 10 including 1MB main memory	119.000	710	3.620
Remote console	5.400	31	187
Workstation printer	6.800	69	239
Workstation printer with paper feeder	7.222	72	252
Additional CPU components, upgrade to Model 30	26.800	85	1.276
Additional CPU components, upgrade to Model 50	29.200	185	3.954
Additional CPU components, upgrade to Model 70	124.500	880	5.105
Model 30 with 1MB main memory	145.800	795	4.896
Remote console	5.400	31	187
1MB main memory increment	25.500	85	1.065
Console printer	6.800	69	239
Console printer with paper feeder	7.222	72	252
Model 50 with 2MB main memory	200.500	1.065	9.915
Remote console	5.400	31	187
First 1MB main memory increment	25.500	85	1.065
Second 1MB main memory increment	16.500	74	454
Console printer	6.800	69	239
Console printer with paper feeder	7.222	72	252
Model 70 with 2MB main memory	325.500	1.945	15.020
Remote console	5.400	31	187
2MB main memory increment (each)	51.000	170	2.130
Console printer	6.800	69	239
Console printer with paper feeder	7.222	72	252
Integrated adaptor for disk drives	9.000	46	518
100MB fixed disk (each)	22.900	185	760
129MB fixed disk (each)	26.500	255	1.040
200MB exchangeable disk (each)	37.350	352	1.556
635MB fixed disk (1st and 2nd disks, each)	128.000	841	4.188
635MB fixed disk (3rd and 4th disks, each)	54.100	410	1.825
Integrated adaptor for magnetic tape units with max. transfer rate of 160KB/s.	1.100	4	31
First integrated adaptor for magnetic tape units with max. transfer rate of 470KB/s.	33.600	124	1.225
Second, third integrated adaptors for mag. tape units with max. transfer rate of 470KB/s (each)	19.750	57	575
First 40/160KB mag. tape unit	24.750	202	801
Second to fourth 40/160KB mag. tape units (each)	22.150	195	684
First 120KB mag. tape unit	32.400	288	1.157
Second to fourth 120KB mag. tape units (each)	28.800	271	1.044
First 120/470KB mag. tape unit	48.100	395	1.810
Second to fourth 120/470KB mag. tape units (each)	42.500	369	1.620
First 470KB mag. tape unit	45.700	378	1.668
Second to fourth 470KB mag. tape units (each)	40.500	361	1.533
Integrated adaptor for diskette drive	850	4	25
Diskette drive	8.500	62	268
Display unit and typewriter keyboard	4.175	31	187
Display unit and data entry keyboard	4.300	31	195
Display unit and programming keyboard	4.300	31	195
Integrated adaptor for two system printers and one card reader	850	4	25
300 lpm printer	30.250	350	1.047
600 lpm printer	40.250	474	1.401
1200 lpm printer	74.750	712	2.436
600 cpm card reader	28.610	248	940
Interface control, for 1st-4th wkstn. adaptor	1.600	10	48
Interface control, for 5th-8th wkstn. adaptor	3.200	20	96
Interface control, for 9th-12th wkstn. adaptor	4.800	30	144
Wkstn. adaptor with 4 IHSS interfaces	1.900	12	77
Wkstn. adaptor with 2 IHSS, 2 RS-232-C/V.24 interfaces	2.600	18	80
Wkstn. adaptor with 4 RS-232-C/V.24 interfaces	2.800	20	87
Wkstn. adaptor with 4 coax. interfaces	1.900	12	77
Byte multiplexer channel	7.900	14	205
Block multiplexer channel, 1.5MB/s	10.500	19	273
High performance block multiplexer channel, 2MB/s	13.500	25	352

The monthly lease is based on a 36-month lease period.

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Nixdorf 8890 Series

SOFTWARE PRICING

	One time License Fee (DM)	Monthly* License Fee (DM)	Mainten-ance Per Month (DM)
NIDOS/VSE Release 1	20.020	715	395
NIDOS/VSE for Model 10, Release 2	42.620	990	980
NIDOS/VSE for Model 30, Release 2	46.725	1.627	980
NIDOS/VSE for Model 50, Release 2	51.975	1.837	980
NIDOS/VSE for Model 70, Release 2	56.700	NA	980
Release 2 contains a number of aids, including ECON, ESF, PWS/VSE, NIFTY and TCP.			
Extended Control Facility ECON	4.480	160	80
Extended Spooling Facility ESF	3.025	108	30
Programmer Workstation, time-sharing system PWS/VSE	4.760	170	35
Tape Management System/VSE TMS/VSE	7.000	250	40
Nixdorf File Utility NIFTY	1.210	43	10
Disk Space Management/VSE DSM/VSE	7.000	250	40
Job Transfer Program JTP	8.400	300	60
File Transfer Program FTP	2.100	75	10
Transaction Control Program TCP	29.250	936	515
Printer spooling TPS	6.400	200	40
Data Entry Generator	6.160	220	30
Cobol compiler	9.410	336	40
Nixdorf Data Base System NDB	24.320	760	190
NDB Data Dictionary	16.000	500	150
NDB Data Query	16.000	500	150
Remote Job Entry Facility	5.600	200	63
NIDOS 3270 Multi-Host Facility	5.600	200	40
Communication Program Generator	12.950	450	65 ■

The monthly license fee does not include maintenance.