

# **Operational description**

**HW 90196 / US**  
**Terminal / US**

**Version 1.00**



**HÖFT & WESSEL**

## General

Please note, that the internal name "HW90196 / US" is equivalent to the product name "Terminal / US".

The HW90196 is a multi-purpose mobile computer. Depending on system equipment and application it can be used for decentralized data registration or server operations via terminals and radio connection. As the actual functional mode is exclusively controlled by the application program, only the capabilities of hardware and the operating system will be explained in the following overview.

## Processor core

The main component of the HW90196 is the microcontroller MC68328 from company Motorola. It operates at a clock frequency of 16,58 MHz which is generated via PLL from a quartz frequency of 32768 Hz. The operating system is stored in a part of the Flash-EPROM-memory of 1MB. The remaining capacity of this non-volatile storage contains a file system, optimized for use with Flash-EPROMS. This memory provides storage for an application program and files. The SRAM-memory of 1MB is partly used by the operating system. The major part of this storage is used for running the application program and its data storage operations.

## Input- / Output devices

The display controller of the microcontroller drives a STN-LCD with a resolution of 320x240 pixel in a graphic mode. The standard font, integrated in the operating system, provides a text resolution of 20 lines by 20 characters. The display provides a LED-backlighting which is controlled by the application program. Furthermore the display provides an analog resistive touch pad that can be operated with the enclosed touch pen. The microcontroller can determine the activated pen position via an electrical interface. The operating system provides functions for the application program to register a signature or graphic display operations.

The keyboard shows 16 illuminated keys with functions printed on. Key „C“ switches on the HW 90196. If the device is switched on, this key serves as a double function: a short key stroke provides key code C(lear), a long key stroke switches off the HW 90196 again. The other printed keys allow input confirmations, numerical inputs and system control with arrow keys. Below the display 4 more function keys are present that are not labeled and cannot be illuminated (F1...F4, left to right). The application program can assign these keys to specific functions which can be presented in the bottom text line of the display.

## Interfaces

The infrared interface of the HW90196 is supported by the IrDA-controller, integrated in the MC68328, and thus compliant to IrDA-standard 1.0. The maximum baud rate is 115200. This interface is used for data transfer with a PC resp. a modem, if an additional communication station is employed, or for configuration of the mobile printer HW 90195.

The radio module HW86020 allows application of the HW90196 as a terminal that is wireless connected to a central server. Data transmission is achieved by a 2,4 GHz band frequency-hopping process. This digital transmission process allows PIN-based access authorization to the base station and provides utility data rates of more than 20000 baud and a transmission range of up to 300 m (open field). The HW 90196 contains an accessible reading unit for customer smart cards and 2 facilities for Plug-in smart cards hidden behind the battery block.

## Power supply

The rechargeable battery HW19196 is used for mobile operation of the HW90196. This is a NiCd-battery with a nominal voltage of 3,6 V and capacity of 1000mAh. It provides a working time of 4 to 16 hours, depending on operation mode. The working time period is mostly influenced by period of display and keyboard lighting time and usage period of radio connection. After a specific period of time, which can be modified by the application program, the HW 90196 turns to sleep mode. This helps to reduce power consumption while the microcontroller remains supplied with power.

The HW 90196 remains for app. 3 minutes in sleep mode even if the battery block is changed. During this period power will be supplied by a high-capacitance capacitor (Gold-Cap). If the battery will not be replaced during this period, the HW 90196 enters a power-on reset as soon as a charged battery will be inserted later. The hardware ensures that the charging capacity of the new battery is at an acceptable

level to ensure a safe start of the HW 90196. Once started, the power management of the operating system monitors the charging condition of the battery block. To avoid the total discharge of an battery block, a major part of the HW 90196 will be disconnected, if the battery shows a charging condition of less than 0,9 V at each cell. That way a minimal power consumption is guaranteed. Still the user has to ensure that discharged battery blocks will not be stored inside the HW 90196 or outside the device for a longer period of time.

The battery may be recharged by inserting them in the corresponding charging casing or by inserting the HW 90196 with inserted battery in a corresponding casing of a charging- or communication station HW 16196 resp. HW 50196.

### Operating system

The operating system provides an interface for the application program and all described features of the HW 90196. After a reset, it also allows the user to configure settings at operation system level, to start an application program that has been downloaded beforehand on the disk, or to copy files from a PC or modem on or from the disk, if the infrared interface or the radio module will be used. These functions can be operated by the Return and the F1 resp. F4 keys, the latter serve for operating system functions as YES resp. NO.

Another important feature of the operating system is the integrated power management. It achieves reduction of power consumption by a doze mode, if the microcontroller operates at low activity. This, together with the automatic switch off of keyboard- and display backlighting, provides a significant increase of battery working time. Also, the battery voltage is monitored continuously. If the voltage drops below a specific level, the display presents a warning message on every key stroke; if the level drops even lower, the HW 90196 automatically turns to sleep mode. Then the battery block has to be replaced by a recharged one and the device has to be switched on again, or the device must be inserted in a charging station.