

# Human-Machine Interfaces - Individual Solutions



- ◆ **For example:**
- ◆ **Aluminum EMC enclosure**
- ◆ **24V power supply**
- ◆ **TFT with touch interface**
- ◆ **Integrated keyboard**
- ◆ **Resolution 480 x 640 to 600 x 800**
- ◆ **Printer, CompactFlash at front**
- ◆ **I/O connections at rear**
- ◆ **MPC8245/266..400MHz (Kahlua II)**
- ◆ **DRAM, CompactFlash**
- ◆ **CAN, Ethernet, serial ... interfaces**
- ◆ **Additional I/O via on-board FPGA**
- ◆ **Java (Internet access)**

A Human-Machine Interface (HMI) is a computer which handles the communication between machines and humans. Thus it deals with any aspects that have an impact on a user's interaction with that system. A machine can be anything from a wristwatch to a large factory. The communication can be the human pushing a button or the machine flashing a lamp.

MEN designs and manufactures the hardware-control electronics, peripheral devices such as printer, touch etc. and housings for Human-Machine Interfaces for a range of applications in the automation industry. Because of the variety of different individual requirements these designs are always full custom solutions.

The HMI design example described here is based on an aluminum front panel covered with a printed plastic film. It houses an 800 x 600 pixel TFT with integrated keyboard (touch input). Located at the front and protected against dust by a cover, a fast printer, an RS232 debug/service connection and optionally a CAN interface are available. The rear side of the HMI provides further interfaces, such as one or two Fast Ethernet lines, another CAN interface, another two to four COMs and the 24V supply.

The electronics inside the HMI consists of two main components: An ESM - Embedded System Module (a complete computer on a single board) and a carrier board for the remaining functions like physical interfaces for the field busses etc. and the power supply. All permanent connections are done at the rear of the system.

The electronics of the HMI is based on a powerful, low-dissipation PowerPC Kahlua II processor. For scalable memory configuration it provides an SO-DIMM socket for data and a CompactFlash slot for program storage. I/O functionality can also be scaled: it comprises various COMs, Ethernet, CAN etc. -- with CAN, several UARTs and graphics implemented in an FPGA. Additional I/O functionality can be realized in a very flexible and cost-effective way by extending the FPGA.

The standard operation temperature for the whole system is 0 to 60°C.

The HMI runs Embedded Linux or real-time operating systems. The Java implementation allows both local operation and access via any type of network, i.e. also the Internet.

Similar HMI configurations are also possible based on a PC core (x86) running Windows. Independent of the processor core, all HMIs can be delivered in a once defined configuration for a minimum of 5 years.

## Technical Data

### Mechanical Specifications

- Aluminum enclosure
- Dimensions: depth 75 mm (max.), width 483 mm, height 288 mm
- IP rating: IP20 according to EN 60529

### CPU

- PowerPC Kahlua II, 266..400MHz

### Memory

- 32..512MB SO-DIMM / 133MHz
- Two CompactFlash slots
  - One located at the front, dust protection cover
  - One inside the system, for program data

### Graphics

- 32MHz video frequency
- 16MB video SDRAM
- 16 bits/pixel (5-5-6)
- Linearly organized frame buffer interface

### TFT

- Hitachi TX31D30VC1CAA
- 800 x 600 pixels, 6 bits/color
- 300 cd/m<sup>2</sup>
- TTL interface

### Touch panel

- Analog resistive touch panel

### Printer

- Fast thermal printer, e.g. Seiko LP1245
- Printing speed > 15mm/s
- Paper feed speed > 30mm/s
- Push button for form feed

### Interfaces

- Serial Connection
  - RS232/RS422/RS485 selectable through software setup
  - Isolated
  - Standard baud rates up to 115.2 kbaud
  - Two handshake lines in RS232 mode
- Ethernet
  - 10/100Mbps/s Ethernet interface
  - One or two channels
  - RJ45 connectors at rear side
- CAN bus
  - ISO high speed
  - Optically isolated
  - Baud rate up to 1Mbit/s
- Debug/Service Connection

- RS232
- Standard connector at front

### Further I/O options through FPGA

- All functions optional, can be factory-programmed as needed
- IDE interface
- SRAM controller
- Quad UART
- GPIO

### PCI bus Extension Interface

- PCI-104 extension slot

### Miscellaneous Features

- SA adapter extension interface
  - For flexible serial interfacing
  - Connection at rear side

### Power Supply

- 24V +/-25%, 0,8A typical, 2A max.
- 3.15t fuse

### Environmental Specifications

- Temperature range (operation):
  - 0..+50°C
  - Airflow: min. 10m<sup>3</sup>/h
- Temperature range (storage): -20..+60°C
- Relative humidity (operation): max. 85% non-condensing
- Relative humidity (storage): max. 85% non-condensing
- Altitude: -300m to + 3,000m
- Shock: 6g/6ms
- Crash: 15g/0.33ms
- Vibration (sinusoidal): 1g/5..2000Hz

### Safety

- PCB manufactured with a flammability rating of 94V-0 by UL recognized manufacturers

### EMC

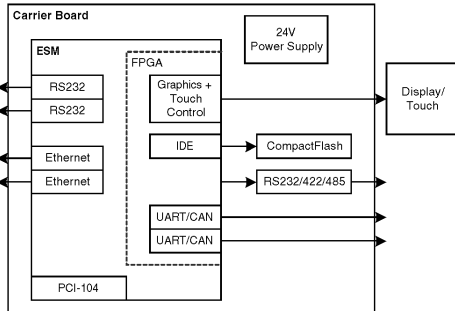
- Tested according to EN 55022 (radio disturbance), IEC1000-4-2 (ESD) and IEC1000-4-4 (burst) with regard to CE conformity

### Software Support

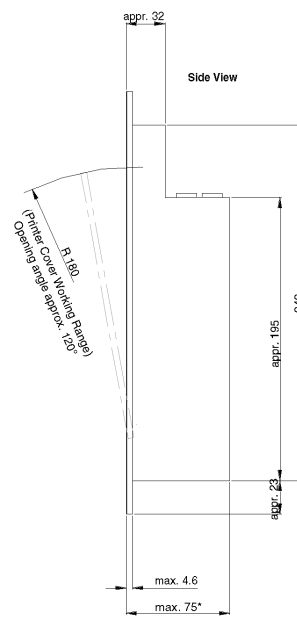
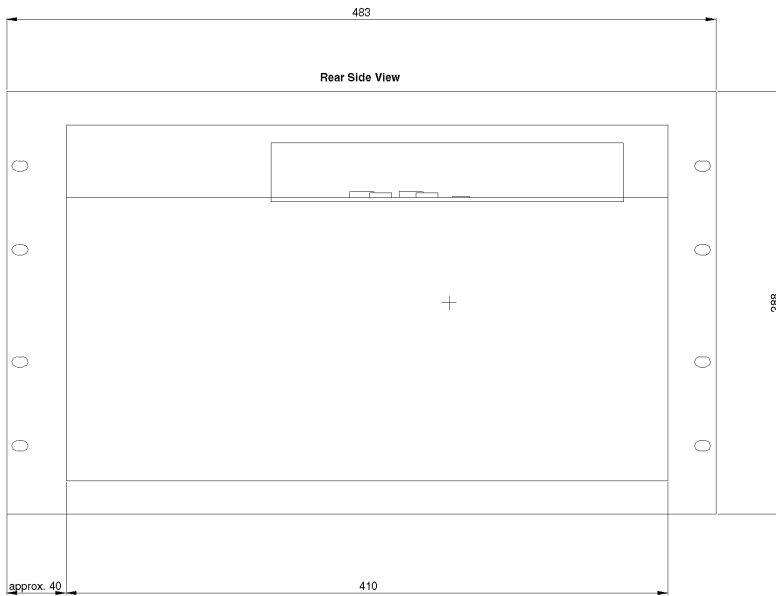
- Embedded Linux
- VxWorks
- OS-9

# Diagram

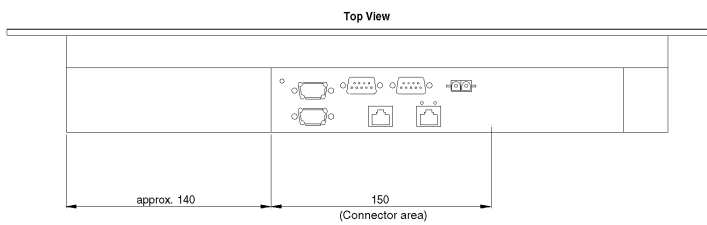
## Functional Blocks



## Views and Dimensions



\* without PC/104-Plus extension



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