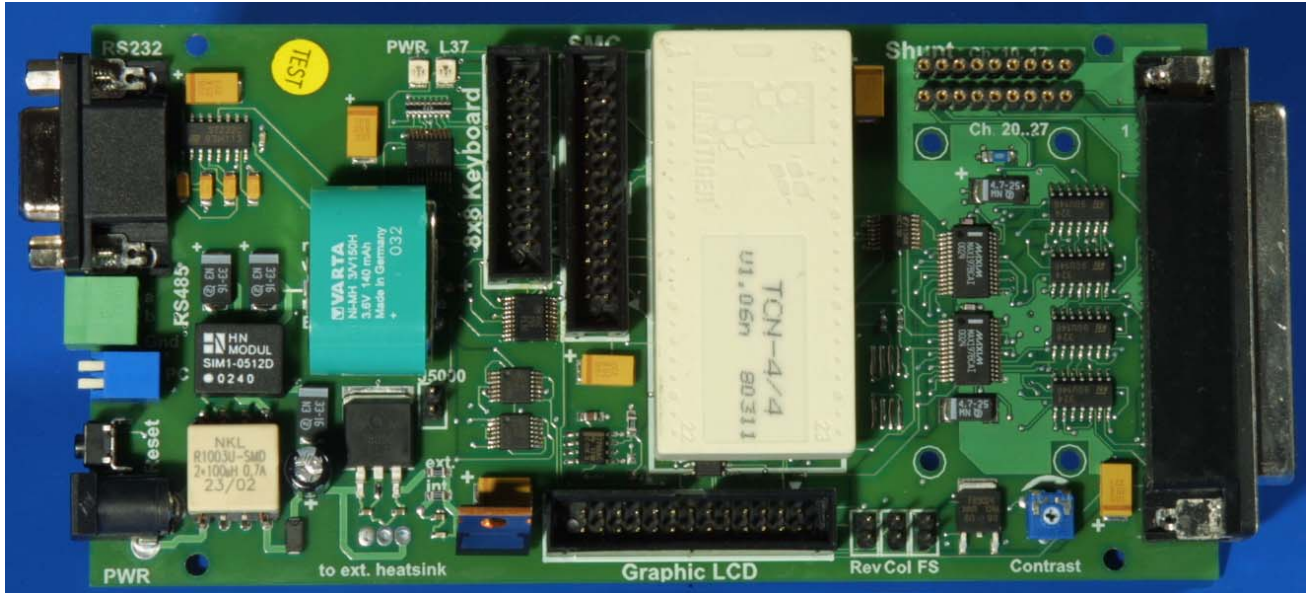


DL7000



Datalogger 7000 V1.0

Technical Documentation



Datalogger DL7000

Datalogger 7000 V1.0

Description: Datalogger DL7000 for industrial and mobile use.

Direct and easy programming, fast running code with a robust, highly stable multitasking system for shortest development times.

Programming is done on the PC in an easy understandable Process-BASIC language. For this an integrated development environment including Editor, Compiler, Downloader and Source-Level Debugger is available. By using FLASH technology the datalogger can be updated at any time, any place and can also save data, parameter sets and settings permanent in FLASH. For recording large amounts of data additionally external FLASH cards are available.

Features: TINY-Tiger High Speed multitasking industry computer
128 KB / 512 KB SRAM / FLASH
512 KB / 512 KB SRAM / FLASH
512 KB / 2 MB SRAM / FLASH

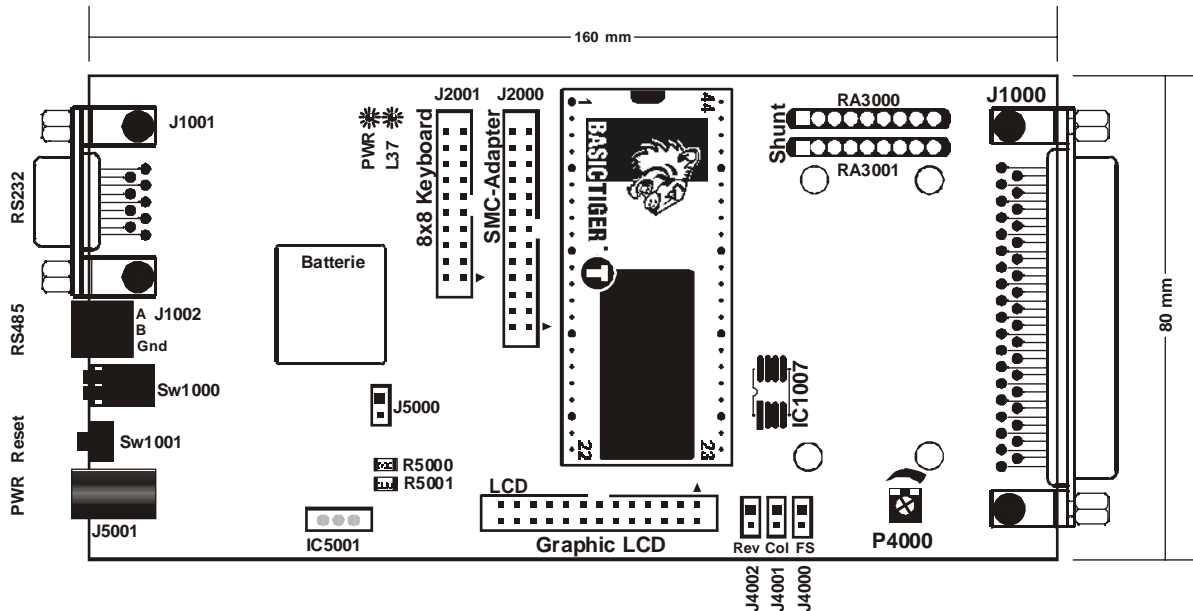
Battery Backup: NiCd Battery, GoldCap or Lithium Battery (Jumper !)
Power supply input 9-15VDC voltage regulator, secured against wrong polarity
In-field programmable (Reset + PC/RUN mode switch, Reset assemble)

1 x RS232
1 x RS485

16 analog channels 12 bit, 0..5V/0..20mA
4 analog channels 8 bit
3 free programmable digital I/Os
3 free digital inputs

Connection for graphical display 240x128
Connection for 8x8 keyboard matrix
Connection for SmartMedia-Card interface

Optional I²C EEPROM onboard



Overview of I/O channels, connectors:

J5000	Connects VCC with the accu. Protective resistor has to be removed if a non-rechargeable battery is used.	J4000	LCD font select
J5001	Power connection Connector for 9V..16V DC power supply	J4001	LCD column select
R5000	Power select Selection of Vcc source: internal	J4002	LCD reverse mode
R5001	Power select Selection of Vcc source: external assembled voltage regulator	P4000	LCD contrast regulator
IC5001	Connection for external voltage regulator	LCD	Connection for graphical LCD
SW1000	PC mode switch Setting of RUN/PC mode	RA3000	8-fold current meter resistor
SW1001	Reset button	RA3001	8-fold current meter resistor
J1000	Multifunction Analog inputs, USER I/Os	IC1007	optional I ² C bus EEPROM
J1001	RS232 interface	L37	Programmable LED on Tiger-Pin L37
J1002	RS485 interface	Power-LED	shows the status of +5V supply LED enlightened => Datalogger is on
J2000	Connection for SMC interface		
J2001	Connection 8x8 keyboard matrix		

Power supply

A 9V..16V DC power supply delivers the operating voltage.

All other supply voltages are created onboard:

- + 5V / XmA
- + 12V / 50mA
- 12V / 50mA

Should a higher current be needed, **instead of** the onboard +5V regulator an external regulator 7805 with appropriate cooling can be connected.

If the **onboard** voltage regulator is used only **R5000** must be assembled.

If an **external** voltage regulator is used only **R5001** must be assembled.

The supply voltage is accessible for the user on multifunction connector J1000.
The following loads can be additionally taken on full load of the DL7000.

+5V	XmA bzw. Belastbarkeit des ext.Regler - DL-Verbrauch
+12V	40mA
-12V	40mA

In case of voltage loss RAM data and realtime clock of the Tiger module are buffered through GoldCap/Accu/Battery. If a non-rechargeable battery used for buffering, J5000 must be removed to prevent the recharging of the battery.

DL7000



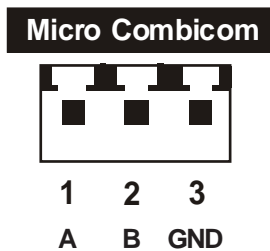
Datalogger 7000 V1.0

Serial Interface:

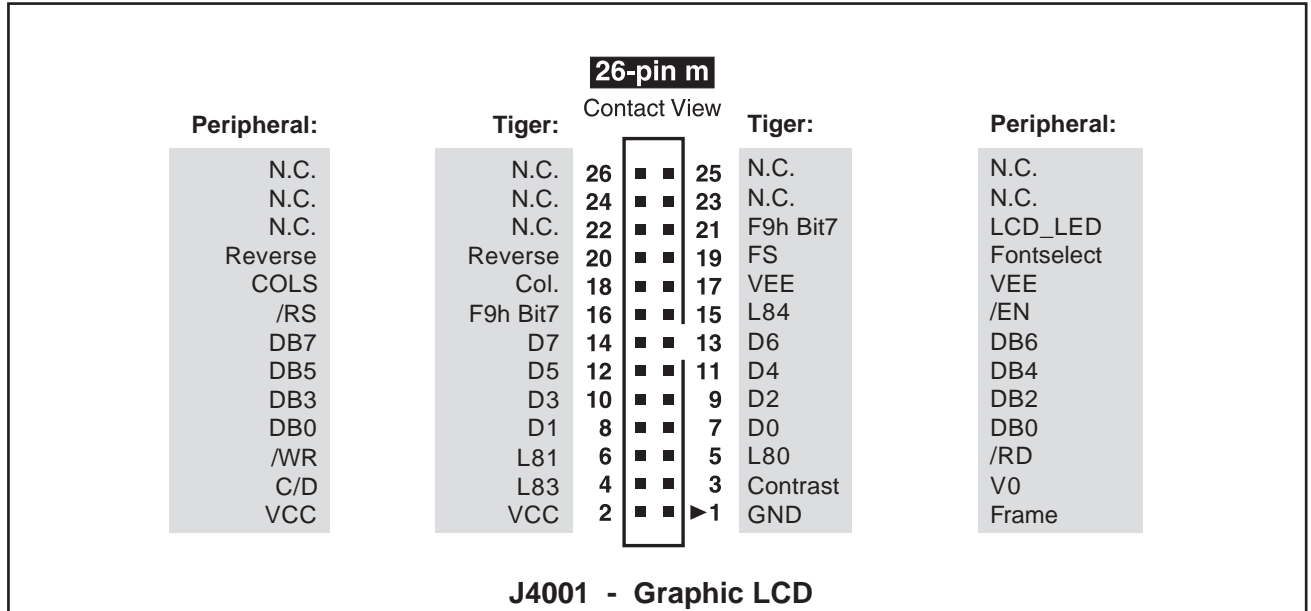
The DL7000 offers two serial interfaces:

- J1001:** The interface Ser1 of the Tiger is lead to the DB9 connector through a V24 interface driver chip as RS232 without handshake. J1001 is used as programming interface for the Tiger module in PC mode.
- J1002:** The interface Ser0 of the Tiger is lead out as RS485 signal and can easily be tapped on the industrial plug.

Connection diagram serial:



Connector diagram graphic LCD:



The connector J4001

- ♦ Power supply of the graphic LCD unit
- ♦ Text / graphic data transmission to the LCD
- ♦ LCD backlight
- ♦ LCD contrast setting

Graphic-LCD type: 240 x 128 pixel, T6963C

LCD backlight: Activated by setting bit LED LCD
XPort: F9, Bit-3

LCD contrast: Pre-setting with onboard potentiometer **P4000**.
Fine adjustment by writing:
XPort: F9, Bit-0...2

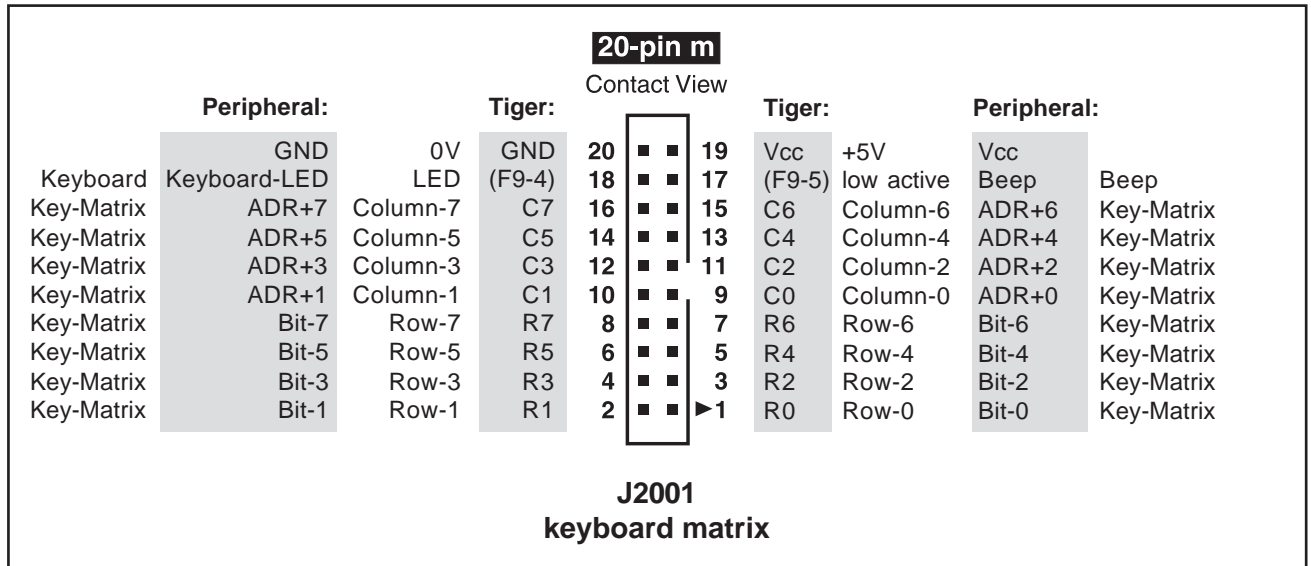
LCD reset: Low active. Reset is done by toggling
XPort: F9, Bit-7

LCD font select: By setting the jumper **J4000** the display's alternative font set is activated.

LCD column sel.: By setting the jumper **J4001** the alternative column distance is chosen (Option, not with standard display)

LCD reverse: Through **J4002** the reverse mode is chosen. (Option, not with standard display)

Connection diagram keyboard- /switch matrix



The connector J2001

- ♦ Power supply for keyboard unit
- ♦ Keyboard LED (for example "Shift-LED")
- ♦ Beeper / key click output, low active
- ♦ 8 x 8 rows and columns for switch scan

The key matrix can read in random combinations of open and closed switches. Therefore this input is suited for realization of keyboards, reading in DIP and HEX switches as well as coding and limit switches in machines and devices.

Also the switch matrix input can query a combination of keyboard and statically working switches in a total of up to 64 switches/key buttons.

The switch matrix can be read in with the XPort functions XIN and XIN\$:

- ♦ Bit value "1" --> contact open
- ♦ Bit value "0" --> contact closed

ADR = The matrix is mirrored in the complete address range **EXh**.

The keyboard matrix scan is furthermore supported by the device driver LCD1.TDD.

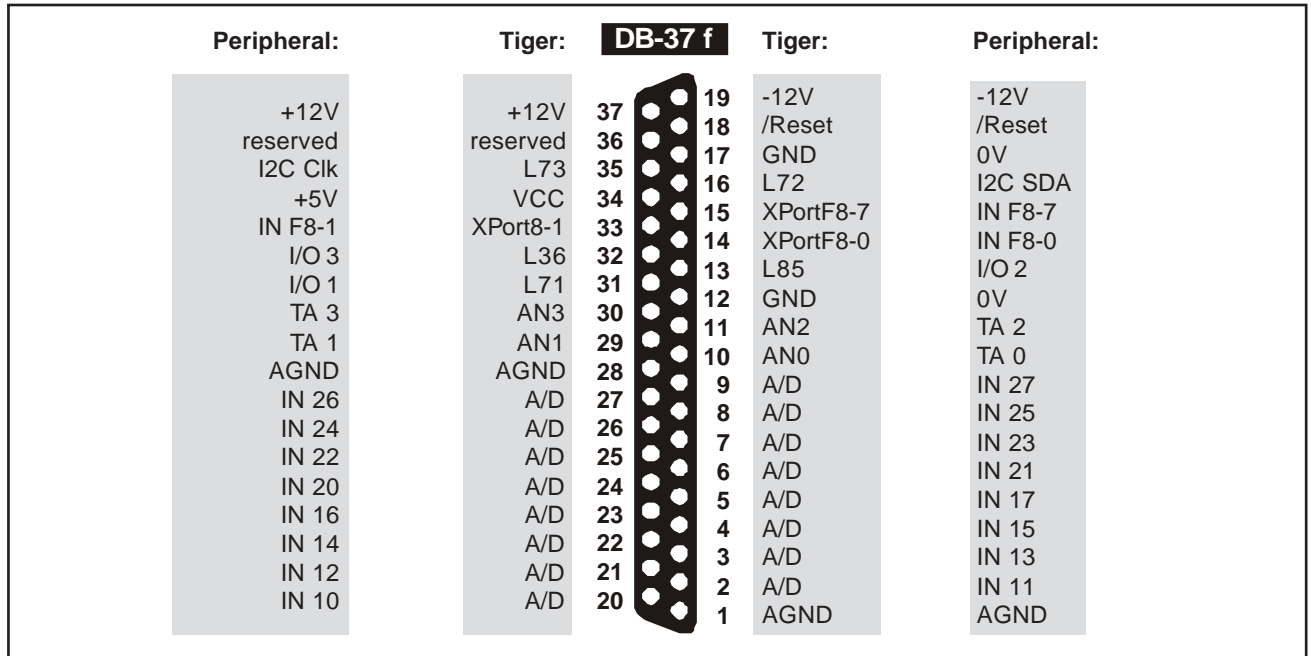
Keyboard LED:

Is controlled through Xport F9, bit 4. A protective resistor of 2.2kΩ is already integrated on the datalogger.

Beep:

The beeper is activated through XPort F9, bit 5 (dig. CMOS output 2mA).

Multifunction Connector diagram



<p>Alarm: Alarm output of the Tiger realtime clock</p> <p>/Reset: Reset input, low active</p> <p>I/O 1..3: Free programmable Tiger I/Os</p> <p>XPortF8-0,1,7: Free inputs. These are read through the corresponding XPort</p> <p>I2C-BUS: I2C_CLK and SDA are both switched with 10k against Vcc. Attention: With assembled internal EEPROM the lowest I2C address is already used.</p> <p>AGND: Isolated 0V input for analog measurements. By setting resistor R5001 AGND is connected to the datalogger's internal ground. R5001 is assembled by default.</p>	<p>TA0..TA3: Are directly connected to the analog inputs of the Tiger.</p> <p>IN10..27: A/D converter inputs. Specifications are shown on the following page</p> <p>+5V/+12V/-12V: Onboard power supply</p>
--	--

A/D channels IN 10..IN 27

Short data:

Resolution:	12 Bit
Precision (stnd)*:	±1 LSB Integral Non-Linearity ±1 LSB Diff. Non-Linearity ±5 LSB Offset Error (unipolar) ±0.5 LSB Chan-to-Chan Offset Error ± 10 LSB Gain-Error 5ppm Gain Temperature Coeff.
Channels:	16
Measure speed:	up to 3200 measurements / sec.
Input ranges:	0...5V, 0...10V, -5...+5V, -10...+10V individually programmable for each channel by software
Input impedance:	High impedance >1 MOhm
Input shunt:	Socket for shunt resistors in SIL8 chassis, input range 0...20 mA: 250 Ohm in 0...5V range

- *) a) Higher precision specifications optional available
b) Further improvement of measurement precision by software methods possible:
(i) Calibration (FLASH table)
(ii) Oversampling
See also: Tiger software documentation "Programming" and "Device driver".

The analog inputs are usually read in with device driver "ANALOG3.TDD" (Detailed information see Tiger-BASIC manual "Device-Treiber").

Connections:

Data bus:	Data I/O	DB0...7	P60...P67
CTRL bus:	Read	-RD	P80
	Write	-WR	P81
	High-Byte-Enable	HBEN	P83
	Chip Enable	-CE	P87
	ADR-0	A0	P70

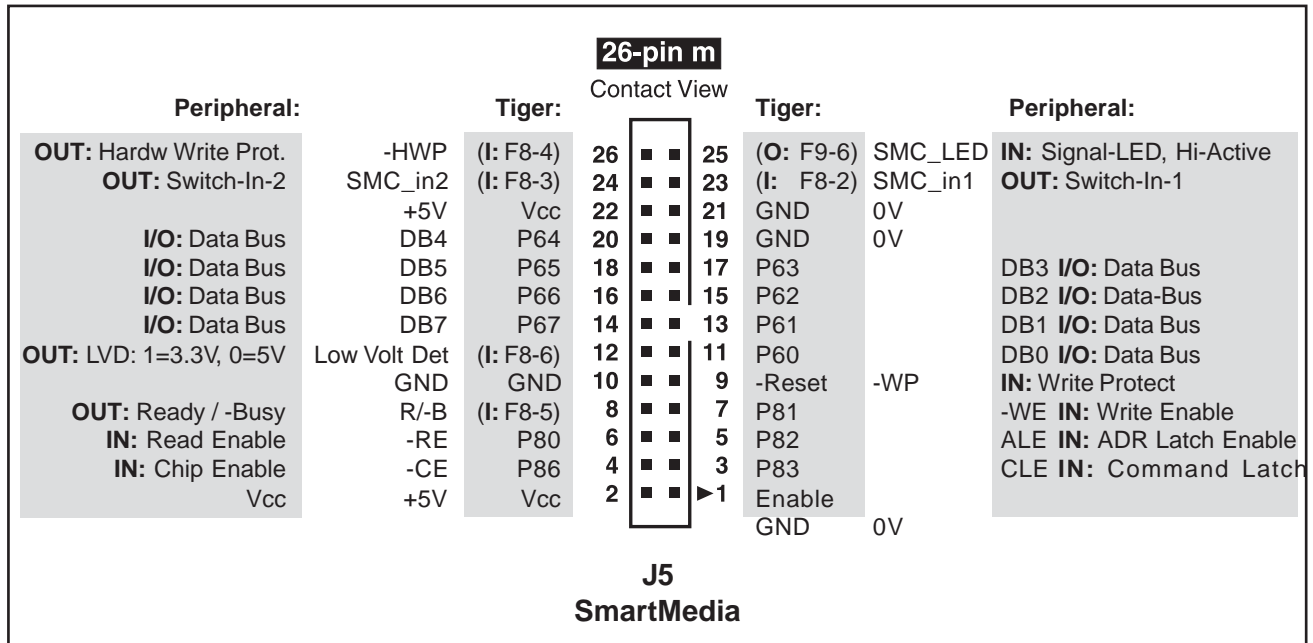
Configuring to 0..20mA input:

To configure the analog inputs of the datalogger as 0..20mA inputs, take the following two steps:

- Each 0..20mA input has to be equipped with a shunt resistor of 250 Ohm against GND. For this the TEC1000 board has 9-pin holders for 8 analog inputs each, which can be assembled either with single resistors or with up to 8-fold SIL-resistor arrays:

RA3000 9-pin shunt SIL 8 x R for 8 x 20mA inputs on analog-IN10..17: 8 x 250 Ohm (5V range).
RA3001 9-pin shunt SIL 8 x R for 8 x 20mA inputs on analog-IN20..27: 8 x 250 Ohm (5V range).
- Set in device driver - e.g. ANALOG3.TDD - the measurement range of the corresponding inputs to "0-5V".

Connection diagram SmartMedia Flash Card connector



The connector J3 connects the TEC1000 board with the SmartMedia adaptor for external FLASH cards up to 128 MByte storage capacity.

Short description of signals:

-HWP Hardware Write Protect. This signal shows if the SmartMedia Card is provided with a write protection label. Then a such marked card should only be read accessed. Read in through: **XPortF8, Bit 4**

Please note: The write protection label has no influence on the medium itself, only when programming an application with SmartMedia usage, by query of that signal it can be secured that on such marked media is not written. Read in through: **XPort F8, Bit 2 (SMCin1) & Bit 3 (SMCin2)**

SMC_In1:	SMC_In2	Meaning:
1	1	No card inserted
1	0	Card inserted right
0	1	Card inserted wrong
0	0	Card inserted wrong

SMC_LED Signal-LED on SmartMedia Adaptor, High level = LED on. Can be

used e.g. to signalize the user present access on the medium. During these times the medium must not be removed, otherwise this could lead to data loss.

Switch on by writing a "1" to **XPort F9, Bit 6**

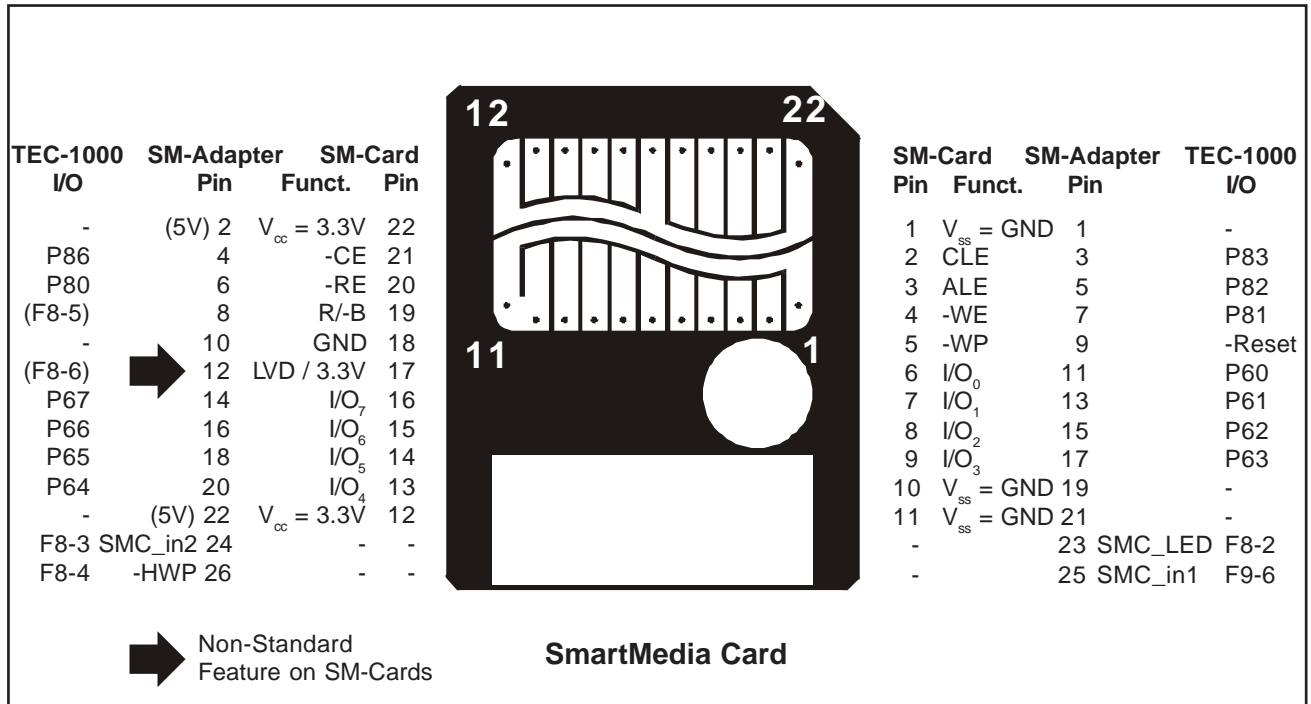
It is advisable to activate this LED already a short time before the actual access to the memory (e.g. 1...2s) to warn the operator in time.

DB0...DB7 Data-Bus, bidirectional transmission of data, addresses and commands.

LVD Low Voltage Detect (available only on few SmartMedia cards), signalizes if a SmartMedia Card operates with 3.3V or 5V: 1=3.3V, 0=5V. Read in through: **XPort F8, Bit 6**

-WP Write Protect, low active This signal prevents the inadvertently writing of SmartMedia memory. By connecting -Reset to this input an unwanted modification of data contents during the power-up phase of the system is prevented.

Connection diagram SmartMedia Flash Card



R/-B	Ready / -Busy signalizes the present access-readiness of the SmartMedia memory. 1=Ready, 0=Busy Query by reading in XPort F8, Bit4
-WE	Write Enable, low active Signalizes the write access on the SmartMedia memory (Address, data or command).
-RE	Read Enable, low active Signalizes the read access on the SmartMedia adaptor (Data and status).
ALE	ADR Latch Enable, high active Signalizes the transfer of an address to the SmartMedia memory.
-CE	Chip Enable, low active
CLE	Command Latch Enable, high active Signalizes the transfer of a command to the SmartMedia memory.

The pinning of this connector allows a direct 1:1 wiring to the SmartMedia adaptor, which also does the 5V (Tiger) to 3.3V (SmartMedia Card) conversion.

Further information about SmartMedia memory cards, functions, device drivers and sample applications:

--> look at SmartMedia adaptor documentation as well as SmartMedia manufacturer information (Samsung, Toshiba, ...)

DL7000



Datalogger 7000 V1.0

I²C Bus

The I²C bus is realized on Tiger pins L72/L73. Onboard here an EEPROM can be connected. Additionally the bus is lead onto the multifunction connector J1000, to enable controlling of further I²C devices. L72/L73 are simultaneously PWM channels of the Tiger - if the I²C bus is not used PWM signals can be created here.

I²C EEPROM

Used are EEPROMs of type: 2402/24256/24512. Accordingly data from 2kbit up to 512kbit can be stored.

DeviceCode: 1010
ChipEnable: 000