MAS MATCH-II
MAS MATCH-II-4

Technical Data

Compact Data Acquisition System for Diagnosis and Monitoring

MAS MATCH-II
MAS MATCH-II-4

General

- Number of analogue inputs   2 [4]
- Number of digital inputs   2
- CPU   16Bit @ 20 Mhz
- Program storage   FLASH ROM, in-system programmable
- Measured data storage capacity   864kByte
- Logbook   more than 16000 entries
- Data retention   3V lithium battery
- Sensor supply   2 x 5V [4 x 5V], 50mA each, independent from each other, smaller output voltage on request
- Data acquisition   12Bit analogue to digital converter, 2000 [1000] samples per second, each channel

Analogue input

- Full scale sensitivity $\pm$1mV to $\pm$10V, fully software controlled
- Gain   6 hardware steps and software controlled fine adjustment
- Offset control   software controlled, 7-fold of full scale reading maximum
- Input filter   100Hz Butterworth, 80dB/decade, other filters on request
- Input resistance   >>10MΩ ($\pm$1mV to $\pm$100mV), 101kΩ $\pm$0,2% ($\pm$100mV to $\pm$10V)
- Common mode rejection   >90dB (high gain), >60dB(low gain)
- Shunt resistor   100 kΩ $\pm$0,2%, software controlled, dedicated shunt line, [none]

Digital input

- Trigger level   ~2.1V
- Hysteresis   ~0.05V
- Bandwidth (used as Frequency Counter)   >5kHz
- Input voltage range $\pm$50V
- Input resistance   92kΩ

Other

- Status LED   giving status information: standby / running

Power supply

- Supply voltage range   6,5V to 26V
- Supply current   less than 90mA, w/o Sensor
- Reverse voltage protection   yes (up to –15V)

Environmental conditions

- Temperature   -30°C...+65°C
- Humidity   0%...80%, not condensing

Casing

- Size in inch (mm) (W x H x D)   3 1/8 x 2 x 1 (80 x 50 x 25) [3 9/16 x 2 5/16 x 1 5/8 (100 x 65 x 25)]
- Mounting   four M3 threads, [four mounting holes, 4.2mm]
- Weight   170g [400g]
- Material   Aluminum
- Sealing   P65

Values for MAS MATCH-II-4 are given in brackets [ ].

Features

- 2 or 4 analogue channels with strain gauge amplifier and sensor supply
- Software controlled gain and offset
- 2 digital inputs
- Rainflow (RF), Level Crossing (LC), Range Pair (RP)
- One or multi dimensional Time at Level (TaL, TaLnd)
- Transient mode (TM)
- Recording of sequential peaks and troughs (SQTMS)
- All data processing done at up to 2000 samples per second / channel
- Remote control via modem or wireless using cellular phone (GSM)
- Small and rugged aluminium casing

Typical Applications

- Long term measurements
- Product supervision
- Fatigue life time estimations
- Test bench supervision
- Quality assurance
- Performance testing
- Remote monitoring of scarcely accessible objects via GSM

Used in Industry and Research

- Cars and Trucks
- Motorcycles
- Construction Site Equipment
- Wind Turbines
- Forging Presses
- Agricultural Machinery

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Evaluation Methods for Analogue Channels

Rainflow - RF
With the method Rainflow closed hysteresis loops are recognised and stored in the resulting matrix. Not closed hysteresis are stored as residue. The programmable amplitude suppression ensures that small signal variations (possibly disturbances) are filtered out.

Level Crossing - LC
The result of the method Level Crossing is derived offline from Rainflow. The crossing of levels is counted as cumulative frequency distributions.

Range Pair - RP
The result of the method Range Pair is derived offline from Rainflow. Range Pair, made of a load increase (over a certain number of classes) and the corresponding load decrease (over the same number of classes), are counted as cumulative frequency distributions.

Time at Level - TaL
The method Time at Level determines online the time when the signal stays in a class. If a signal repeatedly runs through a class during a measurement, the time of the individual time periods of this class are added up.

Time at Level multidimensional - TaLnD
The method Time at Level multidimensional enables to simultaneously carry out "Time at Level" evaluations at a scanning rate of 1ms for up to 3 channels and stores the result as n-dimensional matrix. This enables a statistical assessment of the probability of meeting signals of different levels in up to 3 channels.

Transientenmodus with Trigger - TM
With the method Transient Mode with Trigger the samples are taken and stored in user defined time intervals (up to max. 2,000 Hz per channel) for each individual channel. Since this method is rather storage-intensive, it is supported by various trigger functions.

Sequential Peaks with Time and Master / Slave Concept - SQTMS
With the method Sequential Peaks and Troughs with Time and Master / Slave concept the turning points of defined master channels are sequentially taken and stored with time together with the momentary values of the slave channels (time correlated to the turning points). Any one channel can be defined as master any other channel as slave to the master channel. The programmable amplitude suppression ensures that small signal variations are filtered out

RF+TM+TaL
The combined method RF + TM + Tal permits simultaneous performance of the RF, TM and Tal methods (see also the individual descriptions). The RF and Tal methods are usually applied for long term testing, since they take a maximum of stress information at minimum storage space. However, all information is lost on the shape of the signal. It is often desirable to get detailed information on the time-load progression of the load peaks. This has now been achieved by adding the TM method to the RF + Tal methods: By means of the trigger function of TM, a limit value can be individually defined for every channel for TM recording. By activating the pre-trigger and post-trigger feature, the history and the decaying process can be recorded, too.

RF+TM
By combining the method RF and TM, both methods can be simultaneously carried out. Thus, any channels can be permanently utilised for rain flow measurements, while solely significant signal levels are recorded in the triggered transient mode. The combination of RF + TM sizeably increases the potential measurement time and minimises the subsequent evaluation effort.
RF + TM is an inexpensive alternative to RF + TM + TaL, if the user is not interested in the time at level information.

Virtual Analogue Channel
Virtual channels are not directly associated to a physical sensor, but calculate the actually measured value from analogue and digital channels. The source channels (analogue and digital) can be selected as the user likes. Additional coefficients (constants) can be entered for some of the formulas. The calculation is performed based on the set physical scaling of the used source channels. The user can adjust the actually used data range within some limits. As with other analogue channels, the result of a virtual channel can be converted into another physical unit by defining the sensitivity and offset. It is noted that the result of a virtual channel can be used for calculation of another virtual channel. Thus, the realisation of complex formulas is possible.

Software for Digital Channels

Digital Time - DT
The method Digital Time method evaluates digital signals (e.g. the clutch of a car is engaged or not, its windscreen wiper is on or off). This method can be combined with all above described evaluation methods for analogue channels. This method evaluates digital signals and is used to record the time progression of the digital signals.

Hard- / Software Options

Network
The RS 485 **Network** can control up to **15 MAS MATCH-II (-4) and/or MAS MICRO-II boxes** from one terminal. The connected boxes are also powered via the network, i.e. communications and voltage supply use the same link.
The Network is expandable by plugging additional recorders. The combination of **MAS MICRO-II and MAS MATCH-II boxes** is possible. The whole Network can extend to several 100 meters.
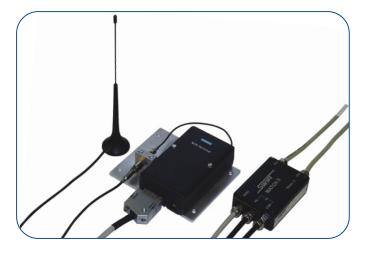
The commands "Start", "Pause", "Transfer" and "Clear" can be executed from the terminal to jointly control all connected boxes. Every box can also be individually controlled for adjusting individual parameters. The communications with any box in the Network does not interrupt the measurement of the other boxes. The connection to the PC is made via an USB-RS485 converter, which is housed in a rugged casing suitable for use at site.

Remote Link
The Remote Link option enables **remote control** and reading **of one or several recorder(s) by modem** via telephone and/or GSM network. The expanded terminal software includes a data bank for the management of several recorders. It stores one telephone number for each recorder (clear text title). By selecting a recorder, it will be automatically connected via modem. The modem is transparent for the user, i.e. there is no visible difference to a direct telephone connection. All available functions remain operational without any limitation. If the Remote Link fails, the data transfer can be resumed later. This is independently possible for each recorder of the data bank. The data bank informs of the respective up-to-date transfer status.

For further hard/software options see separate page