imc Online FAMOS

Data Analysis in the measurement device: Results in Real Time

imc Online FAMOS is a powerful extension for imc DAQ systems. It offers a variety of real-time functions for pre-processing and signal analysis. The mathematical analysis functions are executed on the signal analysis platform integrated in the measurement device. This means that analysis results are available immediately and also independently of the PC. Such pre-processing can also yield significant data reduction and thus reduce the amount of data to be exchanged between the DAQ system and the PC. The results are available in imc STUDIO as virtual channels.

imc Online FAMOS consists of

- an editor in which the user enters the algorithm in the PC
- a compiler which generates the executable program code for the signal analysis platform in the background
- the signal analysis platform on the measurement device

imc Online FAMOS processes the input channels of the system and makes available the results of computation in the form of virtual channels. imc Online FAMOS can not only work with channels, but is also able to read the digital inputs of the system, digital and analog outputs can be set, the virtual bits and display variables can be edited. Thus not only tasks of evaluation, but also control problems can be realized.

The enhancement imc Online FAMOS Professional additionally makes closed-loop control tasks possible.

Especially when using appropriate pre-processing (such as averaging), imc Online FAMOS is able to effectively reduce the data rates and thus the transfer bandwidth (between device and PC), as well as memory requirements.

imc Online FAMOS is device-based and can thus also be deployed in stand-alone applications without any PC.

By means of assignments of complex calculations applied to "virtual bits", which can also be used in the trigger machine, it is possible to achieve complex trigger conditions, for example, in response to the nth harmonic of an FFT-spectrum.

imc Online FAMOS processes continuous data streams from measurements currently being conducted. This means that the analysis results can provide valuable feedback while a test is actively in progress, as a way of controlling and possibly influencing the test procedure. In consequence, the scope of applications far surpasses that of classical "Post-Processing".

Special advantages and applications

- Large inventory of functions from many fields of measurement engineering analysis
- simple, intuitive syntax
- Support in entering and parameterizing functions by means of a formula assistant.
- Color-coded syntax and integrated formula-writing help
- Assignment of channels to Display variable for output on imc Display
- Interaction with other system components such as digital input/output, LEDs, analog outputs, etc.
- As an option, evaluation can be event-oriented and interrupt-driven by means of "*control commands*"
- Condition-driven sequences of functions are supported
- In the "*Professional*" version, the evaluation can be run true-to-cycle
- Virtual channels are parameterized by means of the operating software (imc STUDIO/imc WAVE) GUI. They are handled and administered in the same way as any other, "conventional" measurement channels.

Basic functions

Basic functions	Description	Group A	Group B
Extensive mathematics and calculation methods e.g.	• Basic calculation functions • Basic mathematical functions (trigonometry, logarithms etc.) • Logic and comparison functions • Digital filters: ready-to-go low-pass, high-pass and band-pass filters, freely defined digital filters (FIR, IIR), smoothing filters, hysteresis filters, median filters, ABC-Assessment • Vibration-weighting conform ISO 2631-1, DIN 45671-1, ISO7505 • Acoustics: Sound Pressure Level, LEQ • Transitional Recording (data reduction for analog data) • Numerical differentiation and integration • Statistics functions (mean value, sum, standard deviation etc.) • Resampling • FFT: complex spectrum, invers FFT • Measurement engineering functions such as characteristic line correction • Rosette-calculation	•	•
Input/output	• Reading of input channels • Creating virtual channels	•	•
	• Import/export of virtual bits, e.g. for use with the trigger machine • Import/export of Display variables, e.g. for display on the imc Display • Import of digital inputs • Export of digital and analog outputs • Switching of the LEDs and of the buzzer	•	
	• Process vector variables of the GPS interface can be processed directly • Querying of system information such as synchronization status, remaining memory on device drive	•	
Control flow	• Loops, conditions with interlacing • Timer	•	•
imc Display	• Paging through imc Display in multi-page Display configurations	•	
Time and date	• Current time and date as function	•	
Data storage	• Controlled interval storage	•	

Languages

Sprachen	Group A	Group B
German	●	●
English	●	●
Japanese	●	---
French	◎	---
Chinese	◎	---
Korean	◎	---

● : completely ◎ : partially --- : not available

Documentation

- Component of imc STUDIO/imc WAVE documentation
- Integrated online help in German and English

System requirements and authorization

- imc Online FAMOS is a device option which must be authorized for each device separately.
- Activation at a later date is possible by means of an activation key.

imc Online FAMOS enhancements

Components	Description
imc Online FAMOS	imc Online FAMOS offers a variety of real-time functions for pre-processing and signal analysis.
imc Online FAMOS Professional 4	for test rig operation. Among others for monitoring and open- and closed-loop control tasks.
Online class-counting 5	class-counting and rainflow counting for fatigue analysis
Online order tracking 6	order tracking analysis of rotating machinery

Order code

Components	Order code	Gruppe A		Gruppe B	
		CRFX, CRXT, CRC, CRSL, C-SERIES	SPARTAN, BUSDAQ, BUSFX	EOS	ARGFT
imc Online FAMOS	DEV(1)/OFA	●	○	---	●
Update of imc Online FAMOS on imc Online FAMOS Professional	DEV(1)/OFA-UP	○	○	---	---
Online class-counting	DEV(1)/ONLKLASS	○	○	---	---
Online order tracking	DEV(1)/ONORDER	○	○	---	---

● : included ○ : optional --- : not available

1 : DEV is to be replaced with the device's order code abbreviation.

imc Online FAMOS Professional

imc Online FAMOS Professional is the enhancement for the purpose of operating the measurement device in test rigs. Using it, it is possible to perform monitoring and open- and closed-loop control tasks. Additionally, imc Online FAMOS Professional provides a substantial performance boost in virtual channel computation for all applications, including plain measurement applications (data logging mode).

Basic functions	Description
Enhanced performance of online computations	
Performance enhancement	• Interrupt-driven real-time processing: accurate to a single cycle • Max. cycle rate up to 10 kHz, with guaranteed latency and reaction time • Up to 5 synchronous tasks in different sampling rates • Controller (PID, two-point)
Full utilization of the process vector	• Direct access to the signal conditioners with 10 kHz and minimum latency: "mirrored" instantaneous values of the analog channels as so-called process vectors; e.g for closed-loop control. • Independent of the trigger machine, i.e. values from triggered channels can be processed already after preparation before release of the trigger. • Additional user-specific variables can be created

System requirements and authorization

- imc Online FAMOS Professional is a device option which must be authorized for each device separately.
- Activation at a later date is possible by means of an activation key.
- As an supplemental package, it requires the possession of a valid device license for imc Online FAMOS.

imc Online FAMOS Class-Counting

imc Online FAMOS Class-Counting is the enhancement for statical evaluation of signal plots in accordance with DIN 45 667. This entails analysis of the measured data with regard to instantaneous values, extreme values, and cyclical oscillations by tallying their respective frequencies of occurrence.

Class-counting is primarily used to measure stress and fatigue states and to perform the analysis and prognostication of associated endurance strength, which are based on these measurements. In this field, the Rainflow method has become established, which counts both small and large oscillations with their amplitudes and mean values. An interpolation which approximates the true extreme values is available both as the Rainflow function (ClRainFlowTM) and as an individual function (ClTrueMax).

Basic functions	Description
Single-channel functions	• Rainflow with and without residue, with and without approximation of extreme values. The results are represented as a 3D matrix with amplitude and mean value, or start and target classes. • Range-pair procedure: Classifies the amplitudes of the oscillations as a histogram. • Time-at-Level procedure: The time period during which the measured data remain within a class, as a histogram. • Extreme value approximation: Better approximation of the extreme values by means of interpolation.
Two-channel functions	• Revolutions histogram: tallies the revolutions in the classes of the class-counting channels as a histogram. • Two-channel revolutions histogram: Both the class-counting and the RPM-channel are classified as a 3D matrix. • Two-channel histogram: Two channels are classified in a 3D matrix.

System prerequisites and activation

- imc Online FAMOS Class-counting is a device option and is activated separately for each device.
- Activation at a later date is possible by means of an activation key.
- As an supplemental package, it requires the possession of a valid device license for imc Online FAMOS.

imc Online FAMOS Order-Tracking Analysis

imc Online FAMOS Order-Tracking Analysis is the enhancement for analyzing rotating machinery in real time.

Order-tracking analysis is a method of analyzing noise or vibration coming from rotating machinery. In contrast to frequency analysis, it plots the energy content of the noise not over the frequency but rather over the order, i.e. the noise is "normalized" to the current RPM value.

Basic functions	Description

Functions	• Order spectrum from the time plots of the oscillation and either RPM- or pulse signal (e.g. from rotary encoders) from which the RPMs are derived.
	• Spectrum
	  • Spectrum of the oscillation for a specified RPM-range.
	  • Spectrum plot over RPMs
	• RPM-based signal representation: The time histories of a vibration signal and of the RPM are evaluated to determine the vibration behaviour in reference to the RPMs. The desired RPM-range is subdivided into classes of equal width.
	• Order lines: Order lines as a function of the RPMs (RMS value, or complex).
	• Angle sampling: Sampling of an vibration signal is referenced to the rotation angle, for a given RPM-value or pulse signal
	• Determination of frequency lines: The magnitude and phase of a periodic signal is determined, optionally with approximation.

Preparatory functions	• Smoothing: Low-pass filtering is applied to an oscillation signal, where the cutoff frequency is RPM-dependent.
	• Pulse duration measurement
	  • The time between two pulses is measured.
	  • The course of the RPM signal is derived from the pulse signal.
	• Addition of an angle to an angle signal.

System prerequisites and activation

- imc Online FAMOS Order-Tracking Analysis is a device option and is activated separately for each device.
- Activation at a later date is possible by means of an activation key.
- As an supplemental package, it requires the possession of a valid device license for imc Online FAMOS.

If you have problems or questions, please contact our Customer Support/Hotline:

imc Test & Measurement GmbH

Hotline (Germany): **+49 30 467090-26**

E-Mail: hotline@imc-tm.de

Internet: https://www.imc-tm.com

International partners

For our international partners see https://www.imc-tm.com/imc-worldwide/.