imc STUDIO 5.0R3 Release

What’s New
Innovations in imc STUDIO

• Live data analysis („imc Inline FAMOS“)
• 3.rd party device integration („3PDI“)
• Decoding of protocol streams („Bus Decoder“)

New features in imc STUDIO

New device and hardware functionality (imc DEVICES)

Licensing and prices
Processing of continuous data streams
• Equivalent to imc Online FAMOS (OFA) → Standard „Virtual Channels“
• Fundamentally different to imc FAMOS Post-Processing (completed data sets)

Virtually real-time performance in terms of
• „immediate results“
• „human real-time“
• However: no Sync-Task available in in IFA!

Processing is NOT executed on data acquisition hardware platform
• Implemented on powerful and scalable PC platform (no stand-alone mode)
• → supports combining channels across multiple devices and 3.rd party devices (3PDI)
• Based on „DataProcessing“ technology of imc STUDIO

Uniform
• Uniform syntax and consistent function set IFA – OFA → interchangeable code IFA - OFA
• Flexible partitioning: multiple parallel tasks (automatically distributed on multi-cores)
• New modern editor
Live analysis of data streams
Data Processing: imc Online FAMOS and imc Inline FAMOS
imc STUDIO DataProcessing
PC based data processing technology of imc Inline FAMOS (IFA)

**imc Online FAMOS**

**imc measurement system**

- flash storage
- data buffer
- transfer exchange
- OFA analysis reduction
- real-time system, sampling, trigger
- *primary* data acquisition
- analog „front-end“

**PC - imc STUDIO**

- post processing
- PC HDD
- display
- data files
- Ethernet TCP/IP
- streaming data
- IFA analysis reduction
- interface, 3PDI integration, synchronization

- secondary data acquisition
- PC standard interfaces (Ethernet, USB..)

- data buffer
- data files
- data streams
- ext. devices
- 3PDI
- protocols
- audio video

- analog sensors
- digital signals
- CAN, field busses

- Ethernet
- TCP/IP
- streaming data
Data analysis and real-time processing

imc Inline FAMOS: „immediate results“ for data streams

Performance

immediate results

imc FAMOS Sequencing

PC: imc STUDIO

post processing

imc FAMOS Post-Processing

PC / Server

completed data sets

continuous data streams

physical real time

Immediate results

instants post processing

Inline FAMOS

PC: imc STUDIO

Online FAMOS Professional

Online FAMOS Standard

imc CRONOS: Device Hardware

imc CRONOS: Trigger machine

10 µs 100 µs 100 ms 10 sec 1 h
Overview: OFA vs. IFA
new PC based signal processing platform

**OFA (imc **Online** FAMOS)**
- Device based
- Stand alone capable
- **Physical** real time (some 100 µs)
- Channels of one device
- Limited performance (DSP platform)
- Device related license
- Popup editor

**IFA (imc **Inline** FAMOS)**
- PC based
- requires PC and imc STUDIO
- **Human** real time (some 100 ms)
- **Across multiple devices**, incl. 3.rd party
- **scalable** performance (PC platform)
- PC license (similar to imc STUDIO Video)
- New integrated *editor*

**Common properties**
- **Live analysis**: immediate visual feedback („immediate results“)
- Continuous **data streams**: current active, not yet completed measurements (*not* post processing)
- Common unified **syntax**, function sets and packages
- Additional licenses for order tracking and class counting (fatigue analysis)
Channels originating from same devices (sources)
• START and/or trigger
• Linking and combining channels that share the same trigger assignment (same as with OFA)

Channels from different devices
• Combining Channels that are configured for START (Trigger 48)
• Synchronization of START signals across multiple devices with sufficient precision
• Linking triggered channels from different channels is not supported, because:
  o Trigger_1 can be individually (differently) defined on separate devices
  o Device based trigger signals are not globally propagated nor synchronized:
  o Channel(Device_1) cannot be triggered by Trigger(Device_2)
Operating 3.rd party hardware (i.e. on a test stand)

- **Creating** individual device plug-in scripts by the customer:
  → included in Developer Edition (extended scripting and “3PDI Assistant“)

- **Executing read-made scripts** (developed by the customer):
  - Select (or import) and activate the script with the “3PDI Assistant“ (free, available in all editions)
  - Need to purchase a **License** to deploy and execute **at runtime**

  - Comparable to imc STUDIO Video
  - Can be combined with any imc STUDIO Edition (incl. free Runtime)

  - License comes in two variants „**Inclusive/Exclusive**“:
    - Inclusive: with imc systems involved: 500 €
    - Currently: administrative, End User License Agreement (EULA)
    - Future: automatic detection and verification of involved devices

- **Extra**: additional licenses for ready-made implementations of **“Standard devices“**
  - DigitalScope (Keysight/Agilent)
  - Future implementations by imc (individual prices...)
Licensing of imc STUDIO 3PDI
3.rd party device interface: Workflow, licenses and products

Development PC

imc STUDIO
*Developer*

3PDI Assistant
Script Editor, Templates

create

Custom script

test

License 3PDI

Application PC

imc STUDIO
*i.e. Standard / Runtime*

Scripting and 3PDI Engine

export / import

3PDI Custom

License 3PDI
*i.e.* Inclusive or Exclusive

3PDI imc
License DigitalScope

imc implementations
*i.e.*: Keysight Script

install imc STUDIO

install

© imc Meßsysteme GmbH

3.rd party devices
*and* imc devices

3.rd party devices
*only*

3.rd party
*„Standard“* devices
Details on licensing

• Licensing of „3PDI Custom“ / „3PDI imc“ are completely independent
  → „3PDI Inclusive“ covers customer’s development but NOT „3PDI DigitalScope“
  „3PDI Inclusive“ is NOT an additional prerequisite for „3PDI DigitalScope“

• Pricing of „3PDI Custom“ / „3PDI imc“ is likewise independent
  → Specific imc implementations can have different prices

• Ready-made standard implementations are always treated as „Exclusive“
  → DigitalScope can also be operated „stand alone“ without any imc equipment!

• Selected implementations free of cost available: „demo devices“:

  → AudioDevice PC audio as a data source: microphone, headset, line input
  → ChannelLoader „Replay“ of test data sets from hard disk as a data source

→ Crucial for anonymous first customer contacts via web site!
→ demo STUDIO Download, no salesman available, no imc system at hand
### Global protocol logging

*Log file without logical content*

- **Conventional**, simple requirement
  - Offline analysis only (post processing)

- **Advantages:**
  - One single *protocol channel*
  - Efficient memory usage
  - Complete data contained

### Selektive CAN decoding

*Individual channels with scaling*

- **Advanced**, intelligence + resources
  - Allows live analysis (OFA/IFA)

- **Certain disadvantages however:**
  - High channel count (limit: 512!)
  - Requires more memory (overhead)
  - Need to decide on channel selection

---

**Why worry about trade-offs when you can have the best of both worlds:**

### imc STUDIO BusDecoder

- Log the complete protocol channel (Log file)
- Decoding information embedded into the Log channel (equivalent to separate *dbc*)
- Selective decoding (individual channels) anywhere along the data stream (STUDIO, FAMOS)
Technology

- Applicable to protocol channels (in particular: CAN Log)
- Alternative popular terms for protocol channels: „Log , Log-File, Dump“
- Continuous data streams (current measurement)
- Based on „DataProcessing“ Technology of imc STUDIO (powerful PC platform)
- Embedded decode information (equivalent to dbc): encapsulated and complete, avoiding any need to separately transport, administer and match the corresponding dbc file!
- Flexible and dynamic selection and decoding of outputs as Virtual Channels
- Also applicable to imc FAMOS post processing!

Supported protocols and communication bus systems

- CAN
- MVB (limited)
- SPI (serial bus, custom specific solution for Bosch)

Licensing

- No extra license required! Free feature, available in all editions of imc STUDIO
CAN Assistant:

a) activate message log for all CAN messages (new message: „Definition“)

b) mark all channels to be “potentially” decoded downstream: blue icon („Validity“)
STUDIO DataProcessing (BusDecoder)

→ select global **protocol channel** of the CAN node („CAN_Messages_S1_K1“)

→ activate individual **channels** for decoding (extraction); example shown: only two

STUDIO Setup

→ one single CAN-**protocol channel** only

→ *n* resulting **Virtual channels**
Innovations in imc STUDIO

New features in imc STUDIO

- New functions and extensions
- Improved user experience
- Bug fixes

New device and hardware functionality (imc DEVICES)

Licensing and prices
Product configurator
• Settings will be preserved to facilitate update installation

Global settings
• Preserved settings, persistent in update installation
• i.e. root path for experiments or other subtle settings difficult to memorize ...!
• „Scope“ of individual options is now indicated: Project/Application

Example.: Root folder of projects and experiments:

Green: applies to entire installation („Application“)
Blue: applies to current project only

→ Support for update installation
transparent and understandable project settings
Network configuration

- Device interface configuration integrated into STUDIO (former “imc DEVICES Interface Configuration”), also: automatically launched when no devices have been found
- When finding incompatible network settings PC-vs.-Device: “Currently not reachable”
- Suggestions for fixing!
- Categories “recently configured” for easy navigation
- Overview:
  
  **Current PC configuration**
  
  **Current device configuration**

→ Support with notorious network trouble, traditionally hard to understand...
imc Online FAMOS

• Automatic conversion into code with control commands
  → i.e. detection and assignment of code segments (channels) to respective triggers
• Save initialization of DACs (analog out) via „OnInitAll“

Supplemental files (characteristic curves, messaging)

• New dialog for central administration of all supplemental files
• Assigning files to devices
• Assigning single files (globally maintained) to multiple devices
• Directly open files with associated standard application

Init values

• Now also supported for virtual channels and fieldbus channels

→ intelligent setup support, structured handling of experiment variants
Channel name wizard

- completely *reworked*
- incl. *preview*
- Num, Alpha, custom lists

→ *very powerful tool for comfortable handling of high channel counts in large testing applications*
Channel related meta data

- In addition to data on PC-HDD: now also supported with onboard storage (device HDD, Flash)
- i.e. meta information will also be written to channel properties of FAMOS data files onboard

Channel drag & drop from within the data browser

- Directly into floating curve window
- Into Windows file system (Explorer)
- Into FAMOS variable list and sequence

Channel meta data in browser table

- Meta attributes (standard and custom) can be listed and filtered

→ Improved and efficient handling
Structured workflows with large data / channels
Menus and GUI
• Reworked menu for editing of panel pages (create, copy etc.)
• Support for quick saving of elements into the Repository
• Data browser: drag from channel context menu directly into floating curve window
• Curve window toolbar: activate via context menu

Navigation bar
• Interactive editing (cut out) of curve segments and store to HDD

→ Improved and efficient handling
System information (incl. PC resources)

• New class of variables for parameters on performance and resources („Local system information – Computer“)
  
  o Data rate
  o Memory consumption
  o Free HDD space etc.

Widgets

• Option: additional suffix to channel names: „current measurement name“
• Defining update rate of widgets
• Loading curve window configurations (*.ccv) using symbolic path variable (i.e. current experiment path!)

→ Supervising and optimizing performance
Panel Widgets
New and improved widgets

Special widgets
• Level indicator (signal relative to current range setting)
• Bar graph with arbitrary center line (incl. zero)
• Filling drop-down selection lists with texts (from variables)
• Clocks can now also display duration, measuring time etc.

GPS data and maps
• Map as curve window overlay for GPS data, including map update via internet

Table widgets
• Various improvements

Gauges
• Multi color zones and scales (rings)

Animated graphics
• Dynamic placement (rotation angle) of graphics controlled by variable („graphic switch“)
New symbolic placeholders for use with commands and widgets

• „PROPS“: user defined properties
• „EXPERIMENT.PATH“: now also supported for Monitor edition
• „SQL“: now supports column designators including space characters

Parameter set export

• In addition to csv/xls and txt, now also supports XML format
• Choosing variables for export or delete is supported by multi-selection

“Silent” mode execution

• Optionally suppress prompt or user confirmation (i.e. “file exists, overwrite?”) with
  o Storage assistant
  o Variable export

→ more flexibility with workflow automation
Completed data folder

• „Storage_DirectoryUpdate“
• particularly useful for **cyclic interval measurements**
  (continuous long term monitoring with storage time interval)
• Event will now providing extended information on the completed partial measurement
  such as storage location / **FolderName** (via scripting)

→ **flexible workflow automation**
  *i.e. post processing with cyclically launched FAMOS sequence*

• Attention with cyclic intervals in combination with triggered measurements:
  o Folder will be completed (update) **not until**
    → first trigger event has occurred, that is related to the **following** interval!
  o Careful with very sporadic, non-regular trigger schemes...“!
Innovations in imc STUDIO

New features in imc STUDIO

**New device and hardware functionality**

- imc DEVICES
- Firmware / device drivers
- Support of new hardware modules
- Improvements and bug fixes

Licensing and prices
imc STUDIO 5.0R3 comes with new **imc DEVICES 2.8 R7** under the hood

- Automatically installs with imc STUDIO
- New *device and hardware functions*
- Support for new modules
- *Improvements and bug fixes*

- imc DEVICES is *no longer* published or declared as “operating software”, GUI etc.

- imc DEVICES forms the „invisible“ foundation („firmware, driver“)
- Entire GUI, operation and measurement and all “extended” functionality exclusively via imc STUDIO
**Compatibility and version history**
imc STUDIO vs. imc DEVICES

- imc STUDIO provides and installs imc DEVICES automatically
  - New imc DEVICES is typically NOT compatible with previous imc STUDIO!
  - However: STUDIO is often backwards compatible
    latest imc STUDIO does not necessarily require latest imc DEVICES (but recommended!)
  - imc STUDIO supports *simultaneous operation with multiple versions of imc DEVICES*
    → specific selection of version to be used in current situation
New hardware functions: imc DEVICES 2.8 R7
imc STUDIO 5.0R3 comes with latest imc DEVICES 2.8 R7

imc Messaging
• Sending of encrypted email (SSL3) supported

Network configuration
• Export/import of device network settings
• Display of current IP and MAC (LAN, WLAN)

Remote access to device storage
• „Explorer extension“ with new title and icon (“imc systems”)

Web server
• Web designer supports import/export of created web pages, allowing to →
  o Create pages on high performance device CRFX-2000G (DAB2M)
  o Import/operate on “smaller” device families C-SERIES-N (DABHS)
• Server and Designer (!) run on the device and require certain performance (processing, memory)
• Server will benefit from additional memory extension (nee revision DABHS) - Designer does NOT!
• Designer requires DAB2M (CRFX-2000G) for smooth workflow – only recommended scenario!
• So far, porting of created web pages to other devices had not been possible!

**New:**

a) Create pages with DAB2M

b) Operate them with DABHS

→ Import/export is now available as a workaround solution for these performance issues!

→ **2000G devices (DAB2M) strongly recommended for design work with WebDesigner**

<table>
<thead>
<tr>
<th>Device platform for imc REMOTE WebServer</th>
<th>WebServer display pages</th>
<th>WebDesigner create pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRC, CRFX-400, C-SERIES,… (DABHS)</td>
<td>😞</td>
<td>😞</td>
</tr>
<tr>
<td>+ MEM (Memory extension, new revision)</td>
<td>🙆</td>
<td>import</td>
</tr>
<tr>
<td>CRC/CRFX-2000G (DAB2M)</td>
<td>🙆</td>
<td>export</td>
</tr>
</tbody>
</table>
Hardware support

- **Custom specific** devices and OEM: SPI (Bosch, test of serial bus systems)

- **Fieldbus protocol (automotive)**
  - CAN-ECUs: Seed/Key with *.skb files
  - OBD-2: „ID for tester“
  - Format Extended: masking IBC
  - LIN: MasterBreak configurable
  - IPTCOM: Pre-selection of signals

- **HiL** latest Matlab Versions supported: R2014a/b, R2015a
New hardware functions: imc DEVICES 2.8 R7

imc STUDIO 5.0R3 comes with imc DEVICES 2.8 R7

New amplifier modules

- CRFX/FRQ2-4: for transduces with “xx-to-frequency” output
- CRFX/AUDIO2-4-MIC: with supply (200V) for condenser microphones

New amplifier functions and capabilities

- **Bridge balancing** now supported even during running measurement

- **Characteristic curve linearization** supported for additional CRC amps:
  - new: UNI2-8, DCB2-8, B-8, LV3-8, ICU2-8

- Almost all CRFX amp now support **low-pass** and AAF to **below 50 Hz (down to 10 Hz)**
  - past: UNI2-8, LV3-8, ICU2-8, DCB2-8
  - new: **ISOF-8, ISOF-16, HV2-2U2I**

- CRFX/ICPU2-8 allow **high-pass** down to **0.07 Hz**
Linearization curves on conditioning amplifier

- *Local* processing on the amp, *no OFA* resources required
- Specify characteristic curve with up to **1023 supporting points** via imc SENSORS

→ now supported for most modules and device series

---

Low-pass filter with CRFX amplifiers

- In the past, with CRFX (only this series, NOT for CRC!) low-pass had often not been possible with corner frequencies **below 50 Hz**
- Limitation also applied to (non-transparent) automatically chosen AAF type!
- Background: caused by numerical limitations
- This had been an issue with CRFX only!!

→ this issue is now almost completely solved!
# New hardware functions: imc DEVICES 2.8 R7

Linearization on amplifiers

<table>
<thead>
<tr>
<th>Device series / amplifier</th>
<th>CR-PL, C-SERIES (-N)</th>
<th>CRC</th>
<th>CRFX</th>
<th>SPARTAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNI2-8, DCB2-8, B-8</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓ (B16)</td>
</tr>
<tr>
<td>UNI-8, DCB-8 (obsolete)</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LV3-8, ICPU2-8</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>UNI-4</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>ISO2-8</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓ (U16)</td>
</tr>
<tr>
<td>HISO-8</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISOF-8</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>SC2-32</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OSC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HV-2U2I, AUDIO-4, C8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HV2-2U2I</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>BR2-4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QI-4, AUDIO2-4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

--- Module not available for this device series
✓  imc DEVICES 2.8 R7
✓  imc STUDIO 5.0 R3
Ø  Feature currently not supported
New hardware functions: imc DEVICES 2.8 R7
Minimum low-pass filter with imc CRONOSflex (CRFX)

<table>
<thead>
<tr>
<th>CRFX amplifier</th>
<th>Past</th>
<th>Currently imc DEVICES 2.8 R7</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNI2-8, DCB2-8, B-8</td>
<td>50 Hz</td>
<td>10 Hz</td>
<td></td>
</tr>
<tr>
<td>LV3-8, ICU2-8</td>
<td>50 Hz</td>
<td>10 Hz</td>
<td></td>
</tr>
<tr>
<td>UNI-4</td>
<td>50 Hz</td>
<td>10 Hz</td>
<td></td>
</tr>
<tr>
<td>ISO2-8</td>
<td>20 Hz</td>
<td>2 Hz</td>
<td></td>
</tr>
<tr>
<td>HISO-8</td>
<td>20 Hz</td>
<td>20 Hz</td>
<td>2 Hz in preparation</td>
</tr>
<tr>
<td>ISOF-8</td>
<td>50 Hz</td>
<td>10 Hz</td>
<td></td>
</tr>
<tr>
<td>HV-2U2I</td>
<td>20 Hz</td>
<td>10 Hz</td>
<td></td>
</tr>
<tr>
<td>HV2-2U2I</td>
<td></td>
<td>10 Hz</td>
<td>New HV generation</td>
</tr>
<tr>
<td>BR2-4</td>
<td>20 Hz</td>
<td>20 Hz</td>
<td>2 Hz in preparation</td>
</tr>
<tr>
<td>QI-4, AUDIO2-4</td>
<td>50 Hz</td>
<td>50 Hz</td>
<td>10 Hz in preparation</td>
</tr>
</tbody>
</table>
Innovations in imc STUDIO
New features in imc STUDIO
New device and hardware functionality

Licensing and prices
## Editions

<table>
<thead>
<tr>
<th>Package</th>
<th>Remarks</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>imc STUDIO Standard</td>
<td><em>No longer included in standard delivery for new devices</em></td>
<td>990 €</td>
</tr>
<tr>
<td>imc STUDIO Professional</td>
<td>Recommended for experienced users</td>
<td>1390 €</td>
</tr>
<tr>
<td>imc STUDIO Developer</td>
<td>For developers and system integrators <em>(incl. Automation)</em></td>
<td>4500 €</td>
</tr>
<tr>
<td>imc STUDIO Runtime</td>
<td><em>Free, execution only, no editing (for tests stands)</em></td>
<td>---</td>
</tr>
<tr>
<td>Demo</td>
<td>30 days free license for Developer Edition</td>
<td>---</td>
</tr>
</tbody>
</table>

## Supplemental packages for extension of editions

<table>
<thead>
<tr>
<th>Package</th>
<th>Remarks</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>imc STUDIO Video</td>
<td>Integration and operation of video cameras</td>
<td>750 €</td>
</tr>
<tr>
<td>imc STUDIO Monitor</td>
<td>Additional component to be combined i.e. with Standard Edition</td>
<td>390 €</td>
</tr>
<tr>
<td>imc STUDIO PowerQuality</td>
<td>Power quality analysis, PC based <em>(EN 50160, IEC 61000-4-30)</em></td>
<td>1500 €</td>
</tr>
<tr>
<td>imc SENSORS</td>
<td>Sensor data base</td>
<td>1750 €</td>
</tr>
<tr>
<td>imc Inline FAMOS</td>
<td>PC based analysis of data streams</td>
<td>2500 €</td>
</tr>
<tr>
<td>imc STUDIO 3PDI-Exclusive</td>
<td>„3.rd Party Device Integration“ runtime license, without imc systems</td>
<td>2000 €</td>
</tr>
<tr>
<td>imc STUDIO 3PDI-Inclusive</td>
<td>3PD with imc systems involved</td>
<td>500 €</td>
</tr>
<tr>
<td>imc STUDIO 3PDI-DigitalScope</td>
<td>Keysight/Agilent InfiniVision 6014L</td>
<td>TBD</td>
</tr>
</tbody>
</table>
Thank you for your attention.

See you at: www.imc-berlin.com