

General Specifications ISaGRAF (+Enhancements)

Installation and Licensing
Workbench and Control Run-Time
I/O Communications
OPC Data Access
Trending
Alarms and Events

General

Documentation, Licensing and Other

1. Documentation

- On-Line accessible documentation from application interface.
- Multiple tools to access documentation.
 - o Table of content
 - o Index
 - o Search engine
- Paper version of documentation
- HTML & PDF documentation

2. OPC

- OPC server (DA 2.0) for real-time data access.
- All application variables accessible from OPC DA server:
 - o I/O variables
 - o Tables elements
 - o Structures
 - o Simple variables
 - o Combination of the preceding
- More than 250 simultaneous changes of variable values in less than 500 ms via OPC server.
- Variable writes through the OPC server in less than 100ms (cycle time dependant).
- ISaGRAF Enhanced OPC server compatibility with all 3rd Party OPC DA 2.0 clients (3rd Party client, OPC standard compliance required).

3. Licensing

- License individual modules of ISaGRAF Enhanced suite.
- Create blocks of licenses.
- Unlock Modules individually
- Moveable keys (all licenses on station).
- License log indicates manipulations. License log information:
 - o Key installed

- o Key removed
- o Key moved
- o Key deleted

4. Others

- Compatibility:** Ascendant compatibility for all modules (database updater).
- Internet:** Tools and run-time components are fully Internet capable:
 - o Data access.
 - o Monitor and maintain
 - o Application downloads
 - o Multiple resources (control Programs) situated on multiple targets can communicate via the Internet.
- Hardware and OS's**
 - o Development tools and run-time are "PC based".
 - o Windows based Application development:
 - Windows 98SE
 - Windows NT (SP6a)
 - Windows 2000 (SP2)
 - Windows XP
 - o Run-time OS compatibility
 - QNX V4.25D
 - Windows CE V3.0
 - Windows NT 4 (SP6a)
 - Windows 2000 (SP2)
 - Linux V2.2.16 with RTAI V1.7
 - RTX
 - OS/9
 - VxWorks
- GPS:** Specialized GPS program functions, supported GPS cards:
 - Tpro-PC
 - BC62xAT
- Bumpless:** Redundancy Fail Over
 - o Fast switch over
 - o Manual switch over
 - o Runtime automatic updater
 - o Application automatic updater
 - o Active/standby status

WorkBench

Control development tools, Debugging tools and Run-Time

5. Control Development tools

- Project development independent from implementation
- Graphical development interfaces:
 - o Resource configuration
 - o Data binding configuration between resources
 - o Network configuration
 - o Language editors (IEC-61131, Flow Chart, C)
- Complete IEC-61131 language development support:
 - o Ladder logic
 - o Structure text
 - o Function blocks
 - o Sequential Function Chart
 - o Instruction List
- Flow Chart development
- Many independent or co-dependant (user definable) Resources per target, capable of multiple targets per system.
- Networked control (Resource) distribution / redistribution between targets accomplished by drag and drop method.
- Supported advanced functions:
 - o Advanced mathematic functions
 - o Matrix (PACK)
 - o String manipulation
 - o Trigonometry
 - o ODBC (PACK)
 - o DCS functions (PID, Ramps, etc)
 - o SmartPID (PACK)
 - o Communication (PACK)

- ❑ Function set library enlarged by customized development using:
 - IEC-1131 languages
 - Flow-Chart
 - C language
- ❑ “User Tasks” developed in C, run in parallel and exchange data with ISaGRAF run-time through a documented interface (IXL)
- ❑ Supported variables:
 - Boolean
 - Numerical (integer and real)
 - Timers
 - Multi-dimensional Arrays (1x, 2x, 3x)
 - Data structures
 - Combination of all variables
- ❑ All supported languages coexist and interoperate with resources
- ❑ Import/Export tool allows variable configuration in standard formats:
 - Standard Excel format.
 - CSV format.
 - All variable properties can be imported or exported
 - General information
 - Alarms/events configuration
 - Trending configuration
 - I/O Wiring and addressing
 - Update or replace any existing project database.
 - Cancel import/Export at any time during process.

6. Debugging Tools

- ❑ Compilation Error and warning messages display.
- ❑ Compile programs individually. (A program is a part of a resource (sub-routine) developed with one type of language) for faster debugging.
- ❑ Compile entire resource.
- ❑ Application simulation:
 - On development machine without I/O
 - On target with I/O simulator

- ❑ On-line application monitoring (simulation mode included)
 - Diagnostic screen with run-time information.
 - Graphically monitor languages on-line.
 - Monitor and modify variables On-Line.
- ❑ On-Line modification of applications.
 - Variable modifications are not allowed during On-Line code modification.
 - Process Cycle uninterrupted during download
- ❑ Run resource applications in cycle-by-cycle mode during On-Line modifications.
- ❑ Start and stop resources at any point during the process cycle.
- ❑ User definable cycle time, on and off line.

7. Control Run Time

- ❑ ISaGraf Run-Time engine size is up to 230kbytes with a 49Kbyte data segment.
- ❑ ISaGRAF performance requirements:
 - A 386 Intel processor (33 MHz), 8MB of RAM, 16MB flash disk.
 - 20 to 100 ms cycle time with a small application (100 I/O max)
 - 100 to 500 ms cycle-time with an average application (100 to 1000 I/O)
 - >500 ms cycle time for big application (>1000 I/O)
 - PII Intel processor (233 MHz), 64MB of RAM, >1Gb of Hard disk
 - 1 to 10 ms cycle time with a small application (500 I/O max)
 - 10 to 50 ms cycle time with an average application (500 to 2000 I/O)
 - >50 ms cycle time for large application (>2000 I/O)
- ❑ Mathematical coprocessors not required for ISaGRAF on PC based controllers.
- ❑ One ms time precision.
- ❑ Synchronization with data acquisition (driver synchronization).

- ❑ ISaGRAF functions allow target controller synchronization.
- ❑ Resources are either cyclic or event driven.
 - Event driven programs, one cycle is processed per event.
 - Event driven cycles launched in less than one millisecond after event occurs.
- ❑ ISaGRAF provides programmable Fail-Over functionality.
 - Fast Ethernet (100 Mb) Fail-Over performs in less than 5ms without information loss.
 - Fail-Over, Enable / Disable, user definable at any time.
 - ISaGRAF Fail-Over based on “Hot Standby” principle.
 - OPC server automatically reconnects to new active target with system Fail-Over.
 - Fail-Over sequence is programmable directly in ISaGRAF runtime (control application).
 - ISaGRAF Fail-Over is Bumpless
 - Same cycle Fail-Over transition to secondary (Stand-by).
 - Fail-Over transition with no loss of alarm, event, or trending data.

OPC Data Access

- ❑ OPC DA 2.0 server
 - Fully compatible HMI OPC DA client
 - Compatible with standard OPC 2.0 clients
- ❑ OPC automation interface
 - Objects accessible from VB scripts
 - Gives direct access to OPC data from other applications with embedded VB scripting.
 - Gives direct access to OPC data in programs coded in VB.

I/O Communications

IOManager and I/O Drivers

8. IOManager

- Master and Slave mode available
- Multiple drivers on the same machine.
- Manage parallelism of driver functions
- Manage IO parameters
 - o Protocol
 - o Address
 - o Filtering
 - Debounce
 - Jitter period
 - Raw dead-band
 - o Conversions
 - Raw
 - Engineering
 - Other (Binary, BCD, Gray)
- Manage Drivers Errors
- Retry on error
- Synchronous with resource cycle
- Asynchronous node for slow device
- Third party toolkit
- 1 ms time stamp
- Quality status
- Common driver interface
- Driver monitor

9. Associated Functions and tools

- Variable retention in case of Run-Time Stop or Crash.
 - o Disk
 - o Retentive Memory

10. I/O Drivers

- More than 30 drivers with ISaGRAF basic Functions
 - o Example: (see attachment A)
 - Modbus
 - DH+

- Profibus
- DNP3 (Basic functionalities)
- Etc.
- See Attachment

Alarm and Event

Configuration, Agents, Special Functionalities and Run-Time

11. Basic

- Basic package (without ISaGRAF Alarm and event viewer) allows visualization of all system events errors and warnings using basic windows viewers.
- Errors and warnings can be generated by:
 - o IO communication drivers.
 - o ISaGRAF Enhanced run-time.
 - o Trending run-time.
 - o Alarm and events run-time.
 - o All other modules of ISaGRAF run-time.

12. Special

- System events may be logged displayed without the alarms and events ISaGRAF module using the basic ISaGRAF logger.

13. Configuration and basic functionalities

- Alarms and events Windows server component must reside on an NT v4.0 or Windows 2000 node.
- Alarms and events configuration is performed from the main development interface (workbench)
- Application server parameters options:
 - o Windows NT alarms and events server location
 - o Environment and user security
 - User Access rights
 - User groups
 - Zones
 - o Daily archival on network drive

- o Alarms and events output format
 - Date and Time
 - Server tag Name
 - Description
 - Process value
 - Engineering units
 - Alarms and events priority
- Detailed ISaGRAF Alarms and specific information for a particular alarm on any workstation. (Information can be repair instructions, parts diagrams or equipment layouts - virtually anything) in the following formats:
 - o Acrobat files - .pdf
 - o Movie files - .avi
 - o Text files - .txt
 - o Web files - .htm, .html, .shmtl.
 - o Windows help files - .hlp (These files can be located anywhere on the network. User definable target server parameters)
 - o Server Priority
 - o Logger Priority
 - o Shared memory size (Server and logger)
 - o Buffer size
- Numeric alarm configuration:
 - o Transient filter
 - o Dead-band filter
 - o Alarms limits: HiHi, Hi, Low, LowLow
 - o Rate of Change
 - o Defined hysteresis
 - o Deviation
- Boolean alarm configuration:
 - o Transient filter
 - (Chose between alarms on 0/1 change of state, or 1/0 change of state)
- Numerical events are defined by dead-band
- Boolean events must be defined by choosing between 0→1 change of state, or 1→0 change of state
- Alarm monitoring methods:

- Alarm Summary - every active alarm, every acknowledged alarm and every return to normal.
- Alarm Historian - All alarms, acknowledgements and return to normal.
- Action Summary - Every action or notification being currently executed.
- Action Historian - Every notification ever executed - with success or failure status

14. Action Agents and advanced functionalities

- ❑ Definable alarms from external data source:
 - Third Party SCADA
 - Third party OPC server
- ❑ Configurable action agents:
 - Telephone
 - Pagers - Alpha and numeric
 - 2 way radios
 - Email
 - Marquees
 - Fax
 - PA System
 - Workstation "pop-up" windows
 - Verbal announcements on any networked workstation
- ❑ Simultaneous and back-up notifications
- ❑ Auto escalation; the ability to automatically escalate an alarm to a new alarm state or multiple states if:
 - Alarm persists for a defined period of time
 - Alarm remains unacknowledged for a defined period of time
- ❑ Individual alarm state notification strategy

15. Alarm and Event Run-Time

- ❑ Alarm and event occurrences set on target node
- ❑ Alarms status database is localized on the target node
- ❑ Alarming or generation of events speed determined by programmed cycle time of the resource hosting the variable.

- ❑ No loss of Alarms or events with communication loss or windows Crash
 - If the alarm server on windows is unavailable, events are buffered on target and alarms are available on target.
 - Events and alarms are buffered on target if during communication loss.
 - Buffered events and alarms are updated to windows alarms and events server with restored communication.

Trending

Configuration, Display, tools and Run-Time

- ❑ Two versions:
 - Professional
 - Basic
- 16. Basic presentation**
- ❑ Standard Workbench interface
- ❑ Variable trending properties may be imported with other variable properties (see Import/Export functionality)
- ❑ Target controller server configuration
 - Trend server priority user definable (advanced users)
 - Configurable localization of the trend buffer file (may be on RAM disk)
- ❑ Windows Logger configuration
 - Log trend data in a continuous file
 - Log in roll-over mode (user definable)
 - Create new file each day after specified time
 - Create new file on a timed interval
 - Create new file by specified size.
- ❑ Exporting Utility

- Export tag properties and values at a defined frequency, formatting according to individual curves specification, batch information. Export sensitivity to individual curve time shifts parameters.
- Export Type Definitions
 - Standard Comma Separated Values (CSV)
 - Mathcad Array Format (PRN)
 - Binary Data Export
- User Definable Export Formats via the export file script (.exp) User defined archive files.

17. Basic presentation

- ❑ Color coded drawing of curve data, with settable limits
- ❑ Switch between "Historical mode" and "Live mode"
- ❑ Independent scales for each curve; sizable and movable
- ❑ Time axis – settable left and right edge date-time display
- ❑ Quick Zoom on time axis to view detailed data, Seven levels of magnification
- ❑ Add tags in run-time
- ❑ Access to curve properties
- ❑ Access to control properties
- ❑ Independent ActiveX objects- Trend Graph, Scale Window, Time Displays and Legend.
- ❑ Four orientations of time axis – right to left; left to right; top to bottom; bottom to top;
- ❑ Live Scroll Percent From Edge (0 to 99%) (Specifies the display percentage area in live mode)
- ❑ COM data access:
 - TBASE Tag Data Source
 - OPC-DA Tag Data Source
 - Demo Tag Data source

18. Advanced Functionalities

- ❑ VB Application

ISaGRAF Product Specification

- Trend Link ActiveX control, stand-alone trend viewing
 - User customization through VB application source code.
- ❑ Menu operations for most common operations
- ❑ Tool Bar, Button icons with “pop-up” tips
- ❑ Print Preview
- ❑ Print and Close Buttons
- ❑ Print Operations (with or without dialog)
 -
- ❑ On-line Help

19. Trending on Target

- ❑ Trending is performed on target node
- ❑ Trending speed is defined by programmed cycle time of the resource belonging to the variable
- ❑ No trend data loss with windows Crash
 - Data is buffered on target with loss of windows trend logger.
 - Data is buffered on target with communication loss.
 - Buffered target data is sent to windows trend logger with restored communication.

20. Open architecture

- ❑ DDK IO driver toolkit
- ❑ C function development kit
- ❑ IXL layer API kit
- ❑ Brand label customization kit
- ❑ Alarms, events, trends runtime API kit
- ❑ Runtime OS porting kit