HIMax®
A new era in safety and plant profitability
HIMax
Understanding your business
Your success depends on profitability.

You know what drives plant profitability. That's why you methodically consider everything from the initial process design to the selection of reliable equipment to the implementation of the most efficient maintenance routines. HIMA understands your need to be profitable. We also understand that you buy a safety system to protect your plant and keep your people safe. But does your commitment to safety require a system that makes your business less profitable?

Profitability depends on smart safety solutions.

We think you deserve better than safety controllers that cause costly shutdowns by spurious trips, force you to stop production to perform maintenance and upgrades, limit your production unnecessarily and force you to buy more than you really need.

What if your safety system could drive your plant’s profitability by:

- reducing downtime costs?
- generating more revenue?
- contributing to lower investment cost?
- contributing to lower lifecycle costs?
- eliminating possibilities for human errors?

For too long, safety systems manufacturers have asked you to compromise profitability in the name of safety.
HIMA introduces a new era in safety and plant profitability. It’s called HIMax.

HIMax redefines what you can expect from a safety solution. You experience legendary HIMA safety performance and a new threshold in plant uptime and productivity.

With HIMax, we offer:

- Maximum plant uptime
- A solution that can increase output
- Possibilities to reduce CAPEX/OPEX
- Future-proof, lifetime flexibility
- Open platform integration with all leading DCSs
- Superior ease of use

Best of all, you’ll never outgrow HIMax. It’s available for life. Its architecture and capabilities ensure that as your business grows, HIMax grows with you. Seamlessly. Flawlessly.

It’s the last safety system you’ll ever need.
Improve business performance with HIMax

Achieve maximum plant availability

HIMax delivers availability for life by enabling uninterrupted system operation throughout your plant’s entire lifecycle. This maximizes plant availability and improves productivity.

- HIMax’s XMR® architecture eliminates single points of failure. Redundancy can be customized to ensure optimal protection. Spurious trips are virtually impossible.

- All changes, additions and maintenance procedures are possible without stopping a HIMax system.

- Even proof tests mandated by current industry standards can be conducted online, without any interruption of the safety system.

- HIMax eliminates common-cause effects via physical separation of redundant components.

- HIMax is based on the world’s most proven safety system technology.

Ask yourself

What is the financial impact of an unexpected plant shutdown?

Common cause failure protection

Physical separation of redundant components is one way that HIMax maximizes plant availability. If fire or water in a control room causes critical safety-system components to fail, redundant components installed in another location continue operation and keep the safety system fully functional.
Increase plant output

Improving process efficiency is one of the many ways in which Himax can be used to increase plant productivity and profitability.

How? Himax is engineered with truly advanced computational capability, providing powerful floating-point calculations in the CPUs and fast I/O processing algorithms. Predictive controls can therefore be used to build dynamic models that safely reduce the band between the set point/process variable and the defined trip level. In an ethylene cracker, for example, such modelling could contribute significantly to the output of high quality product, with no reduction in overall process safety.

Ask yourself

What is the impact of a 1 percent increase in plant throughput?
Reduce lifecycle costs
Gain lifetime flexibility

HIMax is a future-proof investment. It delivers the safety you need today and accommodates changes in your business. You pay for exactly what you need, when you need it. Today, tomorrow and 10 years from now. HIMax is the safety platform you can build your future on.

Once deployed, HIMax stays on and never needs to be replaced. It adapts as your business grows. HIMax enables you to expand your plant without the need to allocate preconfigured spare slots.

The HIMax difference:
- Buy only what you need. HIMax adapts to meet virtually any application requirement.
- HIMax can be your single platform for all I/O count, response time and fault-tolerance requirements, as well as centralized or distributed applications.
- Save engineering time and costs using a flexible, intuitive and easily adaptable platform.
- HIMax integrates with any DCS that you use today or in the future.
- HIMax offers virtually unlimited expansion - hardware and software changes can be performed on demand, without interruption, for the full lifecycle. Cabinet size is minimised because there’s no need to allocate slots for spares.
- Benefit from HIMax’s unprecedented performance and system flexibility by integrating more I/Os or greater application complexity per system.
- HIMax is a cost-effective solution with different rack sizes to match your physical space requirements.
- No hidden software costs. With a SILworX software license, you get a single intuitive software tool for all tasks.

Think about it
Applications, modules, system racks and operating systems can be added or modified at any time, without system or plant interruption.

Think about it
All safety systems require periodic proof tests to ensure compliance with the latest standards. With HIMax, these tests can be scheduled on demand, anytime and without interruption of the system and the plant.
Make safety simpler

HIMax is an intuitive, intelligent safety platform. It offers tools and features that make it simpler to use than any other system available today. It helps to eliminate possibilities for human error and saves time in the engineering and start-up phase.

HIMax makes life easier with the following features:

- Automatic module detection
- Fully integrated and protected power distribution eliminates the need for external wiring
- Fast implementation via HIMA SILworX, a user-friendly software tool with an intuitive interface, self-documentation and embedded version control
- Accelerate start-up by building-up and testing the hardware configuration without the application program (Loop check mode)
- Comprehensive diagnostics, automatic recording of 500/2,500 diagnostic entries on each module
- Built-in user management for project- and system access
- HART protocol support simplifies asset management solutions

Ask yourself

How will a reduced workload and faster start-up impact your productivity?

Applications

HIMax fits with all safety and critical control applications in the process industry, including:

- Emergency Shutdown System (ESD)
- Burner Management System (BMS)
- Fire & Gas System (F&G)
- Turbo Machinery Control (TMC)
- High Integrity Pressure Protection System (HIPPS)
- Pipeline Automation and Protection
HIMax Engineered for flexibility and productivity

HIMax is a flexible SIL 3 platform designed for critical production processes that can never afford to go down. HIMax adapts to all I/O count, response-time and fault-tolerance requirements as well as centralized or distributed applications. Yet it always delivers maximum plant availability and future-proof flexibility.

HIMax is loaded with Smart Features

- XMR architecture: scalable redundancy for operation in quad, triple (TMR), dual and single modes
- Unlimited change and expansion of hardware and software, including operating systems, while the system is running
- Fully integrated and protected power distribution
- Three different mechanical sizes, two different field wiring concepts, and rack or panel installation
- Multitasking operations: Separate applications independently executed in the same Processor Module; Each application can be modified without affecting other applications; Each application with user defined scan times.
- Condition monitoring for relay modules
Designed for maximum configuration flexibility

- Fully enclosed modules
- Replace module without disturbing I/O or power wiring
- Three available rack sizes: 10, 15 and 18 slots
- All racks are panel mountable; the 15 slot is also available for 19-inch rack installation
- Fully integrated and protected power distribution
- Different field wiring configurations, including direct wiring and terminal blocks as well as system cable with Field Termination Assembly

The flexible HiMax rack is available in 10, 15 and 18 slots.
Unrivaled system performance

HIMax is the most powerful safety platform ever invented. Its unprecedented performance is based on high-performance components and smart system architectures.

- Cycle time of 50 ms with 1,000 I/Os.
- Split 50% analog/digital
- Unlimited complex calculations
- Impact of calculation of 1,000 PIDs on cycle time: 5 ms
- Signal conditioning directly on I/O modules with no impact on CPU performance
- Up to 200 I/O modules in up to 16 racks per system and 250 systems per safety network
- Up to 2,624 I/Os per cabinet
- Multitasking: Set fixed scan times for dedicated applications
- Sequence of event (SOE), 1 ms resolution quality

Independent multiple applications in one system

- Mix different applications/programs in one system
- Time-critical and non-time-critical applications in one system
- Each program can be modified without affecting others
- Individual Checksums for minimal certification effort
- Add applications reaction free
- Each program with individual cycle/scan time
- Fixed cycle time possible for each application

Optimum diagnostics

- Stores up to 2,500 diagnostic entries in the processor module and 500 entries per I/O module automatically
- Maintenance log includes relevant information such as reload, download, run, stop, force automatically
- All diagnostic information can be transferred to the DCS
- Condition monitoring, e.g., for relay modules
Integration with any DCS

Safety systems must integrate seamlessly with control systems and other automation components. Many integrated safety solutions are based on proprietary protocols and do not offer the desired level of inter-operability. HIMax eliminates this concern through its open platform architecture and flexible, future-proof design.

Your advantage: Choose the DCS system and the safety solution which best suit your application.

A special HIMA competence team has tried and tested all integration options with all leading DCS systems and takes responsibility to find solutions in each project.

Supported protocols include:

- OPC DA and OPC A&E
- Modbus TCP Master & Slave
- Modbus Master & Slave RS485
- PROFIBUS-DP Master & Slave
- PROFINET
- FOUNDATION fieldbus H1 (together with FF-SIS protocol)*
- Send & Receive TCP
- HART protocol*
- ComUserTask, programmable protocols

Adaptable networking and communications

- Various options for remote operation, with distributed control via
  - HIMA safeethernet
  - PROFINET/PROFIBUS with PROFIsafe*
  - FOUNDATION fieldbus safety FF-SIS H1* (as soon as available)
- Up to 20 COM modules per system, each with two fieldbus connectors (9-pin D-sub) and four Ethernet ports (RJ-45), running up to 6 protocols per COM module simultaneously
- One network for all systems

*Details are subject to change
HIMax is designed to maximize plant availability and therefore improve productivity. Key to this promise is HIMax’s revolutionary XMR architecture. XMR combines the best of all existing safety architectures. As the X in “XMR” can represent values from 1 to 4, HIMax offers unprecedented levels of redundancy and fault-tolerance.

The results are “available for life” safety solutions with no single point of failure. Even multiple failures will not trigger a shutdown. Spurious trips are virtually impossible. No need to stop HIMax for any kind of hardware or software expansion or maintenance.

XMR® architecture
Moving beyond TMR fault tolerance and functionality

XMR goes far beyond TMR or any other architecture available today. In the event of an internal fault, HIMax’s XMR architecture enables faulty modules to be replaced online, at any time without any restrictions.

Using HIMax you integrate all the functionalities of your current safety system solution with benefits such as:

- “Available For Life” safety configurations that deliver maximum plant uptime
- Additional fault-tolerance: modes of operation 4-3-2-1-0 with nonstop SIL3 certified safety
- An architecture that delivers the lowest probability of dangerous failure (PFD)
- Unique common cause protection via physical separation of redundant components
- Real cost-savings through scalable redundancy at the channel level

Modify, add or replace components and software at any time. Your process will continue safely and flawlessly.
HIMax delivers common cause hardware protection via physical separation of redundant safety system components. If fire or water in a control room causes critical safety-system components to fail, redundant components installed in another location continue operation and keep the safety system fully functional. This could help to improve availability, plant uptime and productivity.

<table>
<thead>
<tr>
<th>XMR® Modularity</th>
<th>Modes of operation</th>
<th>Architecture</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>X = 1, SIL = 3</td>
<td>1</td>
<td>Single Inputs Single Outputs Single CPU</td>
<td>The original safety architecture - used wherever multiple process facilities need protection without redundancy.</td>
</tr>
<tr>
<td>X = 2, SIL = 3</td>
<td>2</td>
<td>Dual Inputs Dual Outputs Dual CPUs</td>
<td>The most widely used safety architecture providing absolute safety and availability.</td>
</tr>
<tr>
<td>X = 3, SIL = 3</td>
<td>3</td>
<td>Triple Inputs Triple Outputs Triple CPUs</td>
<td>A traditional architecture, also known as TMR, which can provide similar safety and availability characteristics as X=2. This application is offered for customers who &quot;require&quot; TMR technology.</td>
</tr>
<tr>
<td>X = 4, SIL = 3</td>
<td>4</td>
<td>Quad Inputs Quad Outputs Quad CPUs</td>
<td>An application that provides maximum common cause hardware protection and maximum availability.</td>
</tr>
</tbody>
</table>
The world's most advanced safety application manager

SILworX is HIMA's new, easy-to-use, fully integrated configuration, programming and diagnostic environment. Its state-of-the-art interface helps users avoid mistakes and speeds up the engineering process. Different levels of user guidance, clear display of all status and diagnostic information and comprehensive validation tools help engineers achieve safe applications.

HIMax Module Specifications

Compliance with all major standards

- IEC 61511:2004
- ANSI/ISA-84.00.01-2004
- EN ISO 13849-1:2006 (PL e)
- EN 62061:2005
- EN 50156-1:2004
- EN 12067-2:2004
- EN 298:2003
- EN 230:2005
- EN 61131:2:2003
- EN 61000-6-2:2001
- EN 61000-6-4:2001
- EN 954-1:19996 (Cat. 4)
- NFPA 72:2007
- EN 60079-15:2003 ATEX (ZONE 2, T4)
- ANSI/ISA-51.04 CLASS G3
- UL (UL 508)
- cUL (CSA-C22.2 No. 142)
- FM CLASS 1 DIV 2 (FM 3600, 3611, 3810)
- Achilles Level I Certification (X-CPU 01, X-COM 01)

HIMax has achieved Achilles security certification, widely recognized throughout industrial automation.
SILworX highlights:

- A single fully integrated software tool for all necessary tasks throughout the system lifecycle
- One license - all functionalities
- Intuitive user interface with fully graphical drag & drop programming
- Flexible programming using Function Block Diagrams (FBD), Sequential Function Charts (SFC), Structured Text (ST) and Cause & Effect (C&E)
- IEC 61131-3-compliant, supporting all functions and variable types for safety-related programming
- Application validation using offline simulation, online test and code comparison
- Force I/O command for easier troubleshooting
- Project-wide cross-references and navigation
- XML import/export for project conversion
- Compatible with Microsoft Windows XP and Vista

<table>
<thead>
<tr>
<th>Central modules</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor module</td>
<td>X-CPU 01</td>
<td>4 x RJ-45</td>
</tr>
<tr>
<td>System bus module</td>
<td>X-SB 01</td>
<td></td>
</tr>
<tr>
<td>Communication module</td>
<td>X-COM 01</td>
<td>4 x RJ-45, 2 x 9-pole D-Sub, up to 6 different protocols</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input/output modules</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input modules</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital input module</td>
<td>X-DI 64 01</td>
<td>64 channels, 24 VDC</td>
</tr>
<tr>
<td>Digital input module</td>
<td>X-DI 32 01</td>
<td>32 channels, 24 VDC</td>
</tr>
<tr>
<td>Digital input module</td>
<td>X-DI 32 02</td>
<td>32 channels, 8.2 VDC, proximity switch</td>
</tr>
<tr>
<td>Digital input module</td>
<td>X-DI 32 03</td>
<td>32 channels, 48 VDC</td>
</tr>
<tr>
<td>Digital input module</td>
<td>X-DI 32 04</td>
<td>32 channels, 24 VDC, SOE</td>
</tr>
<tr>
<td>Digital input module</td>
<td>X-DI 32 05</td>
<td>32 channels, 8.2 VDC proximity switch, SOE</td>
</tr>
<tr>
<td>Digital input module</td>
<td>X-DI 16 01</td>
<td>16 channels, 120 VAC</td>
</tr>
<tr>
<td>Analog input module</td>
<td>X-AI 32 01</td>
<td>32 channels, 4...20 mA</td>
</tr>
<tr>
<td>Analog input module</td>
<td>X-AI 32 02</td>
<td>32 channels, 4...20 mA, SOE</td>
</tr>
<tr>
<td>Counter module</td>
<td>X-CI 24 01</td>
<td>24 channels, 0...20 kHz</td>
</tr>
</tbody>
</table>

| Output modules           |         |                                       |
| Digital output module    | X-DO 32 01| 32 channels, 24 VDC, 0.5 A, short-circuit monitoring LS, individual channel shut-off |
| Digital output module    | X-DO 24 01| 24 channels, 24 VDC, 0.5 A, line monitoring LS/LB, individual channel shut-off |
| Digital output module    | X-DO 24 02| 24 channels, 48 VDC, 0.5 A, line monitoring LS/LB, individual channel shut-off |
| Relay output module      | X-DO 12 01| 12 Channels, 230 VAC/DC, current measurement, cycle counting |
| Digital output module    | X-DO 12 02| 12 channels, 24 VDC, 2 A, short-circuit monitoring LS, individual channel shut-off |
| Analog output module     | X-AO 16 01| 16 channels, 4...20 mA, pairwise galvanically isolated |

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size of modules</td>
<td>All</td>
<td>310 x 29 x 230 mm</td>
</tr>
</tbody>
</table>
HIMA is the world’s leading independent designer of automated safety solutions used in the process industry. Over the past 40 years, more than 20,000 HIMA systems have been installed worldwide to protect the assets of the world’s major oil, gas and processing companies. That same technology is being applied to develop new, creative solutions for machine and building safety. You’ll find HIMA solutions in more than 80 countries.

We are dedicated to developing safety solutions that deliver maximum safety and maximum availability – nonstop. We help companies of all sizes specify the right solution, install it properly and operate it successfully.

Founded in Germany in 1908, HIMA has a record of safety system innovation that began in 1970, when we introduced the world’s first TÜV-certified safety system. Approximately 25 percent of our 600 employees are dedicated to research and development. With offices and agents in more than 50 countries, we are equipped to support projects from initial consulting through ongoing maintenance and upgrades.

Unlike many other safety system providers, we have remained independent. That independence and German family ownership contribute to our exclusive and unmatched focus on safety, expert knowledge and customer responsiveness.
For a detailed list of all our subsidiaries and representatives, please visit our website: www.hima.com/contact