1. Hadron Xtorm Series Characteristics

Figure 1: Hadron Xtorm Series – Overview

Hadron Xtorm Series is the state-of-the-art solution regarding Remote Terminal Units (RTUs). The series presents an ideal set of high-performance features, ease of use, accurate and complete diagnostics, modern and robust design, as well as several innovative features. Hadron Xtorm features an intelligent and versatile architecture, offering modularity in inputs/outputs points (I/O), redundancy options, high-speed communication protocols such as IEC 61850, and logic implementation in accordance with IEC 61131- 3 standard. As a result, it is an ideal RTU for all supervisory applications and control of the generation, transmission and distribution of electrical systems such as hydroelectric power plants (HPPs) and power substations.

Hadron Xtorm Series holds advanced technology on its bus. Due to a high-speed Ethernet interface, it enables the sharing of inputs/outputs and data information within multiple controllers in the same system. The system can be easily divided and distributed throughout the field, enabling the use of expansion racks providing the same performance as a local module. Therefore, all types of modules can be used both on the local rack and on its expansions without restrictions. In order to interconnect the rack expansions, the user may use a simple Ethernet cable.

2. Modules List

Below is the complete list of modules. For more information, please refer to the product documentation for each module.

2.1. CPUs - Central Processing Units

- **HX3040:** High-speed CPU, 6 Ethernet ports, 2 serial channels, memory card interface, bus expansion support and redundancy support

2.2. Input Modules

- **HX1100:** 32 DI 24 Vdc Module w/ Time Stamping
- **HX1120:** 32 DI 125 Vdc Module w/ Time Stamping
- **HX6000:** 16 AI Voltage/Current Module
- **HX6020:** 8 AI Temperature (RTD) Module

2.3. Mixed I/O Modules

- **HX6065:** AC Measurement / 4O Voltage/Current Mixed Module

2.4. Output Modules

- **HX2200:** 16 DO Relay Module
- **HX2300:** 16 DO 24 Vdc Relay Module w/ CBO
- **HX2320:** 16 DO 125 Vdc Relay Module w/ CBO

2.5. Power Supply Modules

- **HX8300:** 60 W 24 Vdc Redundant Power Supply
- **HX8320:** 60 W 125 Vdc Redundant Power Supply

2.6. Backplane Racks

- **HX9001:** 9-position Rack
- **HX9003:** 18-position Rack

2.7. Software

- **HD8500/ADV:** MasterTool Xtorm

2.8. Accessories

- **HX9102:** Backplane Connector Cover
- **HX9405:** 04-terminal Connector
- **HX9401:** 06-terminal Connector
- **HX9402:** 10-terminal Connector
- **NX9202:** RJ45-RJ45 2 m Cable
- **NX9205:** RJ45-RJ45 5 m Cable
- **NX9210:** RJ45-RJ45 10 m Cable
- **NX9101:** 32 GB microSD memory card with miniSD and SD adapters

3. Innovative Features

Hadron Xtorm Series brings several innovations in system usage, supervision and maintenance. These features were developed focusing on a new concept in the automation of hydroelectric power plants, substations and other applications of this segment. The list below shows some new features that users will find in the Hadron Xtorm Series:

Battery Free Operation: Hadron Xtorm Series does not require any kind of battery for memory maintenance and real time clock operation. This feature is extremely important because it reduces the system maintenance needs and allows the use in remote locations where maintenance can be difficult to be performed. Besides, this feature is environmentally friendly.

Multiple Block Storage: Several kinds of memories are available to the user in Hadron Xtorm Series CPUs, offering the best option for any user needs. These memories are divided in volatile memories and non-volatile memories. For volatile memories, Hadron Xtorm Series CPUs offer addressable input (%I), addressable output (%Q), addressable memory (%M), data memory and redundant data memory. For applications that require non-volatile functionality, Hadron Xtorm Series CPUs bring retain addressable memory (%Q), retain data memory, persistent addressable memory (%Q), persistent data memory, program memory, source code memory, CPU file system (doc, PDF, data) and memory card interface.

One Touch Diag: One Touch Diag is an exclusive feature that Hadron Xtorm Series brings to PLCs. With this new concept, the user can check diagnostic information of any module present in the system directly on CPU's graphic display with one single press in the diagnostic switch of the respective module. OTD is a powerful diagnostic tool that can be used offline (without supervisor or programmer), reducing maintenance and commissioning times.

OFD – On Board Full Documentation: Hadron Xtorm Series CPUs are capable of storing the complete project documentation in its own memory. This feature can be very convenient for backup purposes and maintenance, since the complete information is stored in a single and reliable place.

ETD – Electronic Tag on Display: Another exclusive feature that Hadron Xtorm Series brings to PLCs is the Electronic Tag on Display. This new functionality brings the process of checking the tag names of any I/O pin or module used in the system directly to the CPU's graphic display. Along with this information, the user can check the description, as well. This feature is extremely useful during maintenance and troubleshooting procedures.

4. Architecture

The Remote Terminal Unit (RTU) of the Hadron Xtorm Series is a modular solution with flexible configuration, composed by multiple processors. It offers several options of communication protocols and input and output modules, enabling its use in applications with a large number of I/O points.

4.1. CPU

The CPU features many integrated functions, online programming, high memory capacity, six Ethernet ports, two serial channels, one input port and one output port for the time synchronization signal. The six Ethernet ports are available for configuration and programming, use on IEC 61850, DNP3, IEC 60870-5-104 networks, MODBUS TCP, and embedded web server. In addition, the CPUs have two serial interfaces for connecting local HMIs and use in MODBUS RTU networks, a memory card slot for storing application source code and program updates, a port for receiving the IRIG-B time synchronization signal and another output port for this signal, used so that the CPU can perform time synchronization of other equipment.

4.2. Modules

The modules present high density I/Os. Each I/O module has a display for local diagnostics, which shows the status of I/O each point. There are also multi-functional diagnostics on the status of the modules. All diagnostic information can also be accessed remotely by the CPU, communication protocols or through the MasterTool Xtorm configuration tool.

4.3. Application Examples

Below we can see an example of a typical architecture using the Hadron Xtorm Remote Terminal Unit (RTU).

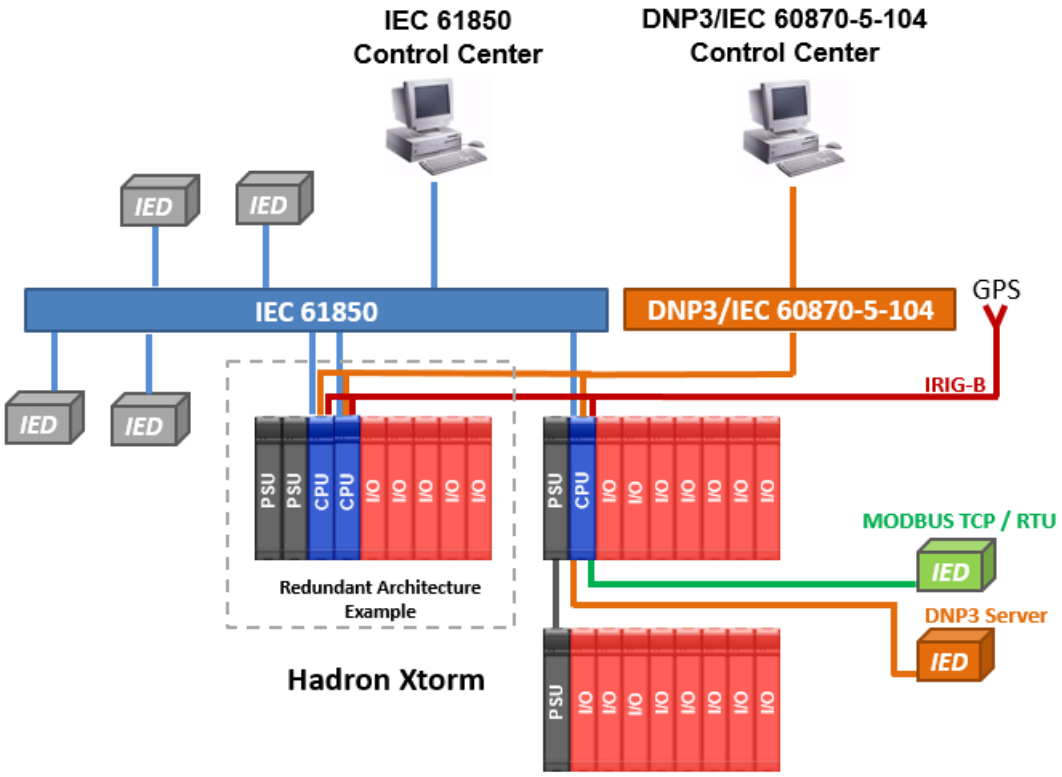

Figure 2: Application Example

4.3.1. CPU with Local I/O

This architecture is based on a single rack, called local rack. This rack consists of a CPU, a power supply module and the I/O modules required for the application, as shown below. The order of the modules must follow the configuration rules presented in the configuration tool.

This architecture is intended for small applications, where there are a low number of I/O points.

Figure 3: CPU with Local I/O

4.3.2. CPU with Remote I/O (Bus Expansion)

This architecture is based on a main rack (where the CPU is located) and remote racks. The communication between the local rack and the remote racks is done through the expansion ports, located on the HX8300 and HX8320 module. Each remote rack requires its own power supply module. The HX8300 and HX8320 module has two RJ45 ports, one of which is used for input data and the other for output data.

In this application example, only the output port of the local HX8300 or HX8320 module is connected, leaving the input data port open. On the other hand, in the last remote rack, it is the output data port that is left open. The remote racks in between have both ports connected: one port connected to the previous rack and the other to the next.

This architecture is intended for medium and large applications, where there are a high number of I/O points.

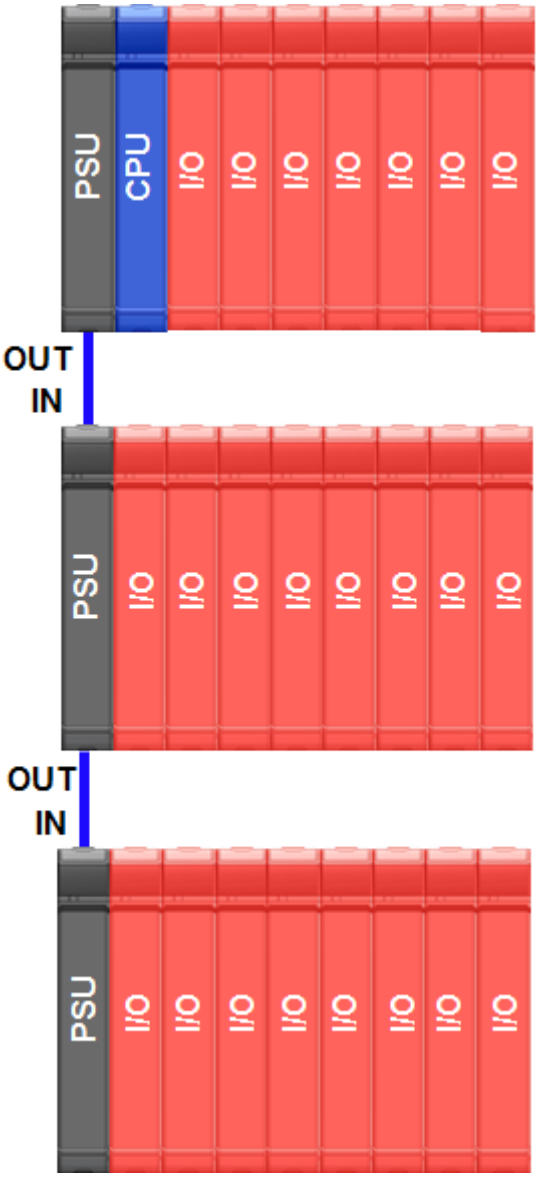

Figure 4: CPU with Remote I/O (Bus Expansion)

4.3.3. CPU with Remote I/O (Bus Expansion with Loopback)

Similar to the previous one, this architecture is based on a local rack (where the CPU is located) and remote racks. The communication between the local rack and the remote racks is done through the expansion ports, located on the HX8300 or HX8320 module. The only difference with the previous architecture, is that the output data port of the last remote rack is connected to the input data port of the main rack.

This architecture allows the system to maintain access to remote rack information even in the event of a failure in the expansion cables. The CPU will detect the single failure in one of the cables and redirect the internal data paths to support this failure. In this case, a diagnostic alarm will also be generated for the user. This feature has advantages in the maintenance of the cables with the system powered up, as well as increasing the availability of the overall system. In the figure below it is possible to visualize this proposed architecture.

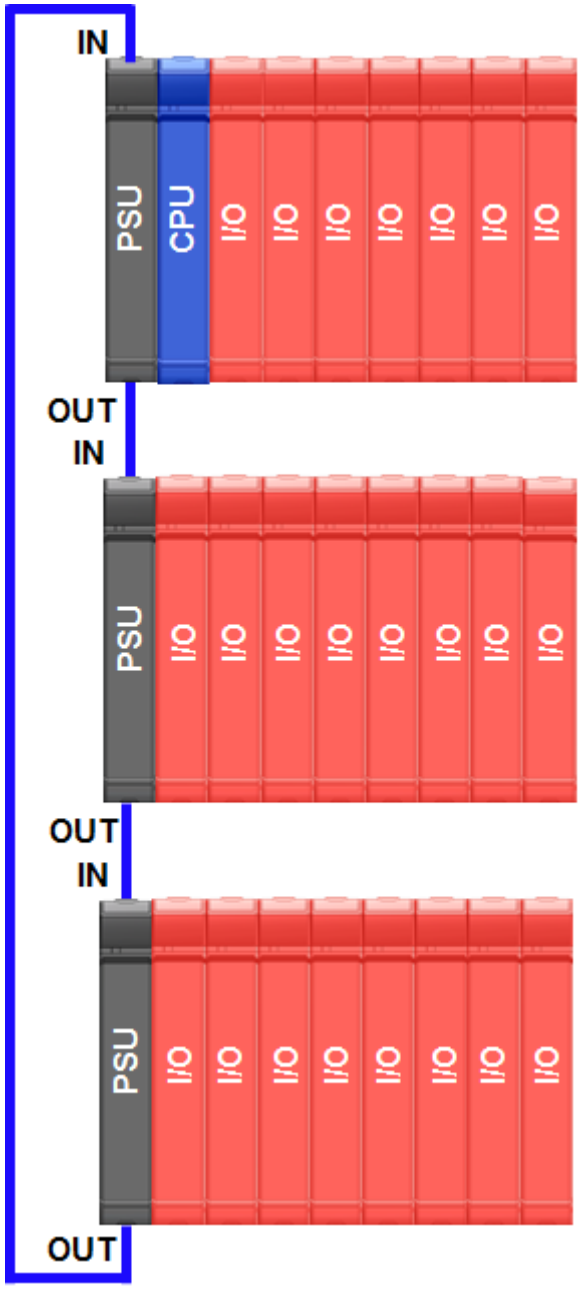

Figure 5: CPU with Remote I/O (Bus Expansion with Loopback)

4.3.4. CPU with Remote I/O and High Availability (Bus Expansion Redundancy with Loopback)

This architecture is based on the use of two HX8300 or HX8320 modules per rack. With two bus expansion modules, the system has a high availability, as it supports failure in the bus expansion cables or in the HX8300 or HX8320 module itself.

Similar to the previous architecture, this architecture is intended for systems where maintenance is critical and the system needs to be available for long periods. In this architecture, the racks should be assembled according to the diagram below, with the HX8300 or HX8320 modules located side-by-side in the first positions of the rack.

Note that there are unused bus expansion module ports, which should be left disconnected.

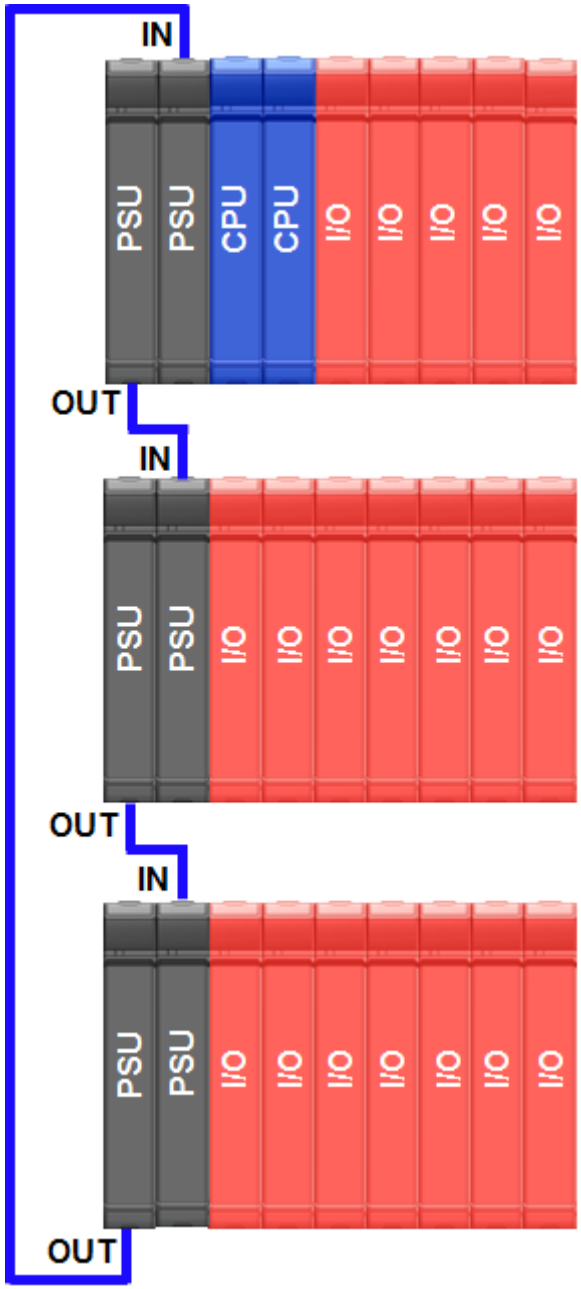

Figure 6: CPU with Remote I/O with High Availability (Bus Expansion Redundancy with Loopback)

4.3.5. CPU and Power Supply Module Redundancy

For critical applications, the Hadron Xtorm Series offers CPUs and Power Supply Module redundancy in the same rack, and when the user chooses to use CPU redundancy in its architecture, it must also use Power Supply Module redundancy.

In this architecture, the system will have one CPU performing the control task (active) and another remaining in reserve, in a hot-standby topology. In case of failure of the active CPU, the system will automatically perform a switchover (event where the spare CPU becomes active). This means that critical applications are no longer affected by eventual control system failures, ensuring high availability for these applications. The results are increased efficiency, productivity, minimized downtime, and reduced maintenance time.

The configuration of the two CPUs must be identical. The active and the standby CPU must be in rack positions that support such functionality (rack positions 3 and 4). This application is easy to configure and requires no special programming or parameterization.

For Power Supply Module redundancy, if one of the modules fails, automatically the second one will take over. On each module there will be an indication of its operating status and input power supply voltage. This status can be used to detect and replace the failed module. Such status can be read by the CPU via the bus and reported to monitoring devices such as an operator terminal or Human Machine Interface (HMI) or a SCADA supervisory and data acquisition system. A failed module can be replaced during normal system operation, without requiring a power down or interruption of the application.

Figure 7: CPU Redundancy and Power Supply Module

4.3.6. Time Sync via IRIG-B

For applications where time synchronization with other equipment is required, the Hadron Xtorm Series CPU has one input port and one output port for the IRIG-B signal. Through the input port, the CPU will receive the time synchronization data and synchronize with its internal clock. And through the output port, the CPU can synchronize other equipment, retransmitting at the output port, the signal received at the input port.

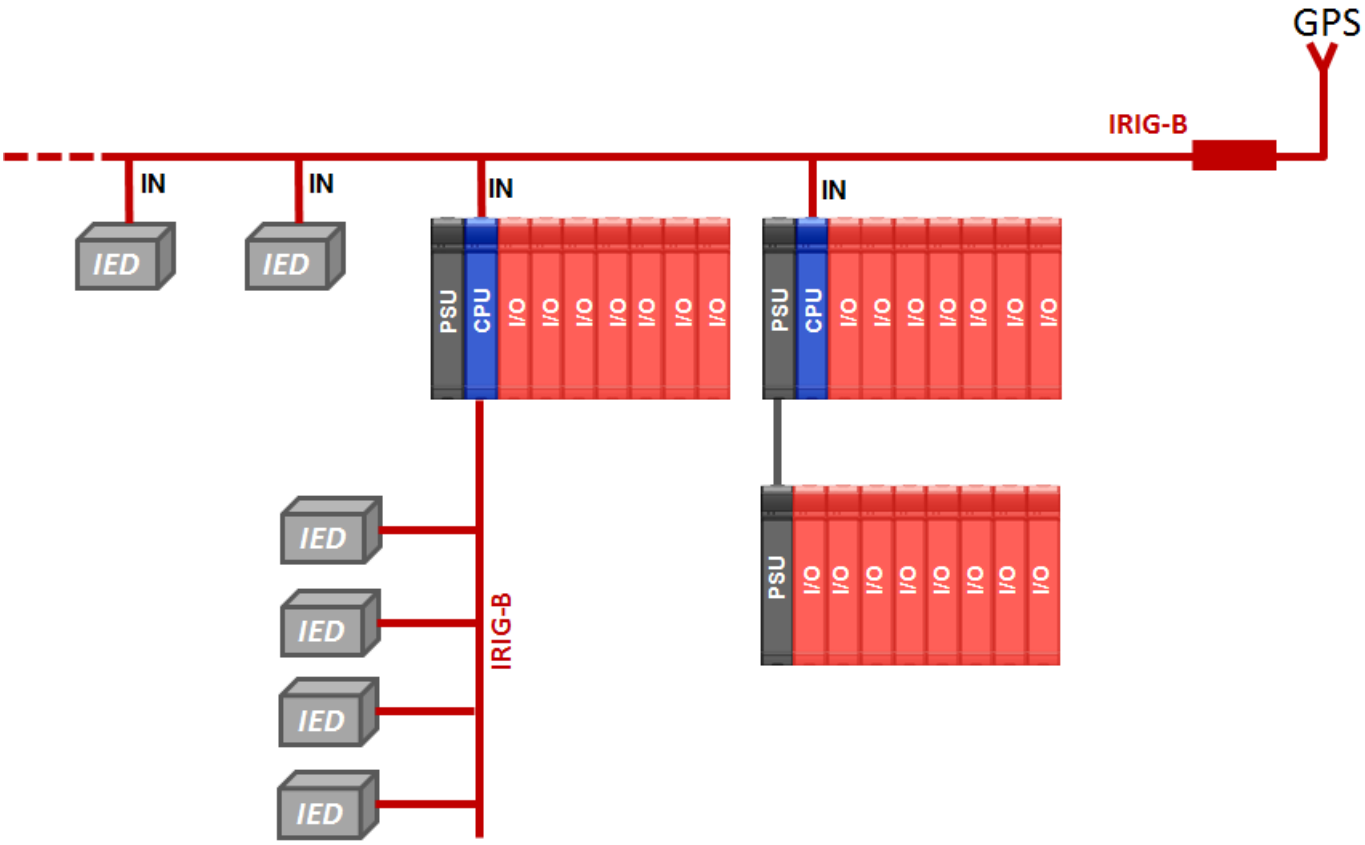

Figure 8: Time Synchronization via IRIG-B - Simple CPU

For cases of applications where CPU redundancy is used, it is convenient that the time synchronization signal be interconnected to each of the CPUs, regardless of which CPU is in active mode and which is in standby mode, thus ensuring system time synchronism. In the figure below is an example of this type of architecture.

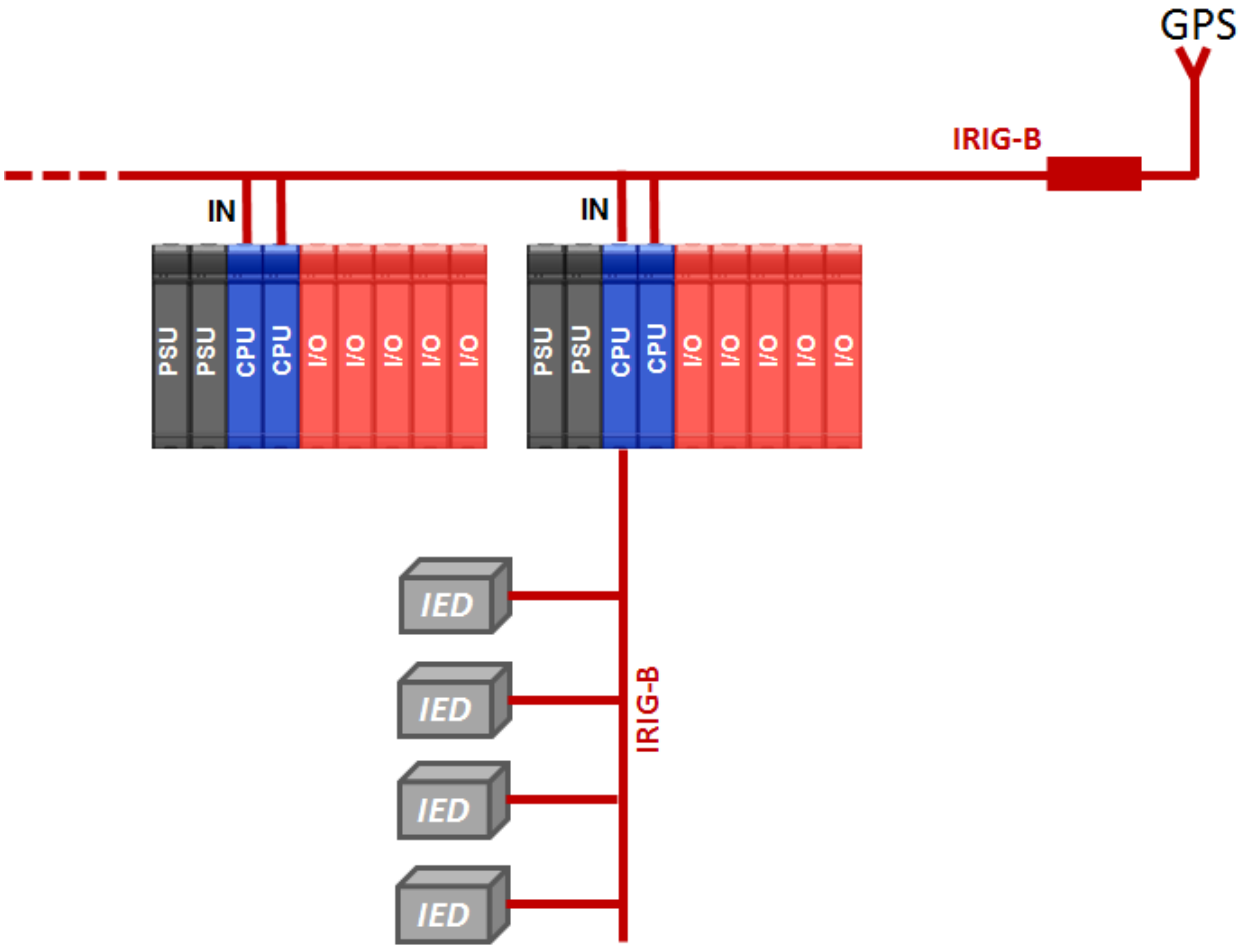

Figure 9: Time Synchronization via IRIG-B - Redundant CPU

4.3.7. Ethernet Redundant Networks with NIC Teaming

Each CPU can have one or more network protocols configured for communication with the control center or other field devices or equipment. For Ethernet network redundancy with NIC Teaming, two Ethernet ports of the CPU must be configured to form a redundant pair. A set of two Ethernet ports forming a NIC Teaming pair has a single IP address bound to the port pair. In this way, the control center does not have to worry about changing the IP if any of the ports in the NIC Teaming pair fails. Each of the Ethernet ports must be interconnected to different switches. If one of the ports fails, automatically the data packages will be redirected to the other port.

This Ethernet architecture enables high availability of system communication and is strongly suited for bridging faults on Ethernet ports, cables, and switches.

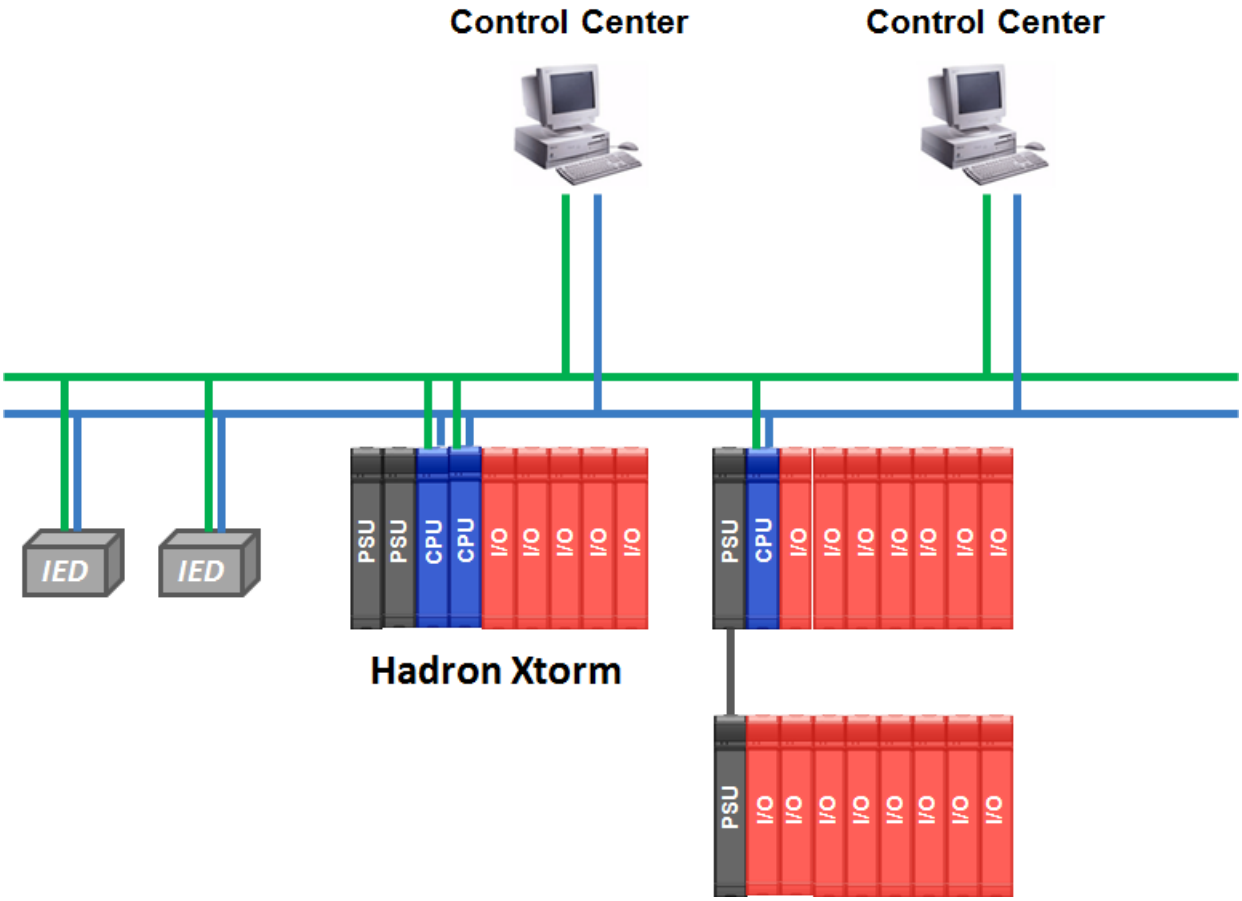

Figure 10: Redundant Ethernet Networks with NIC Teaming

4.3.8. Ethernet Networks in Ring Mode

There is a mode of operation that turns a pair of Ethernet interfaces into a switch, where communication can be done over both ports. This makes it possible to implement a ring network topology.

In this ring, it is necessary to include an external switch that can manage it, to avoid loops that degrade network performance.

All Ethernet interfaces have individual diagnostics, making it easy to debug any problems.

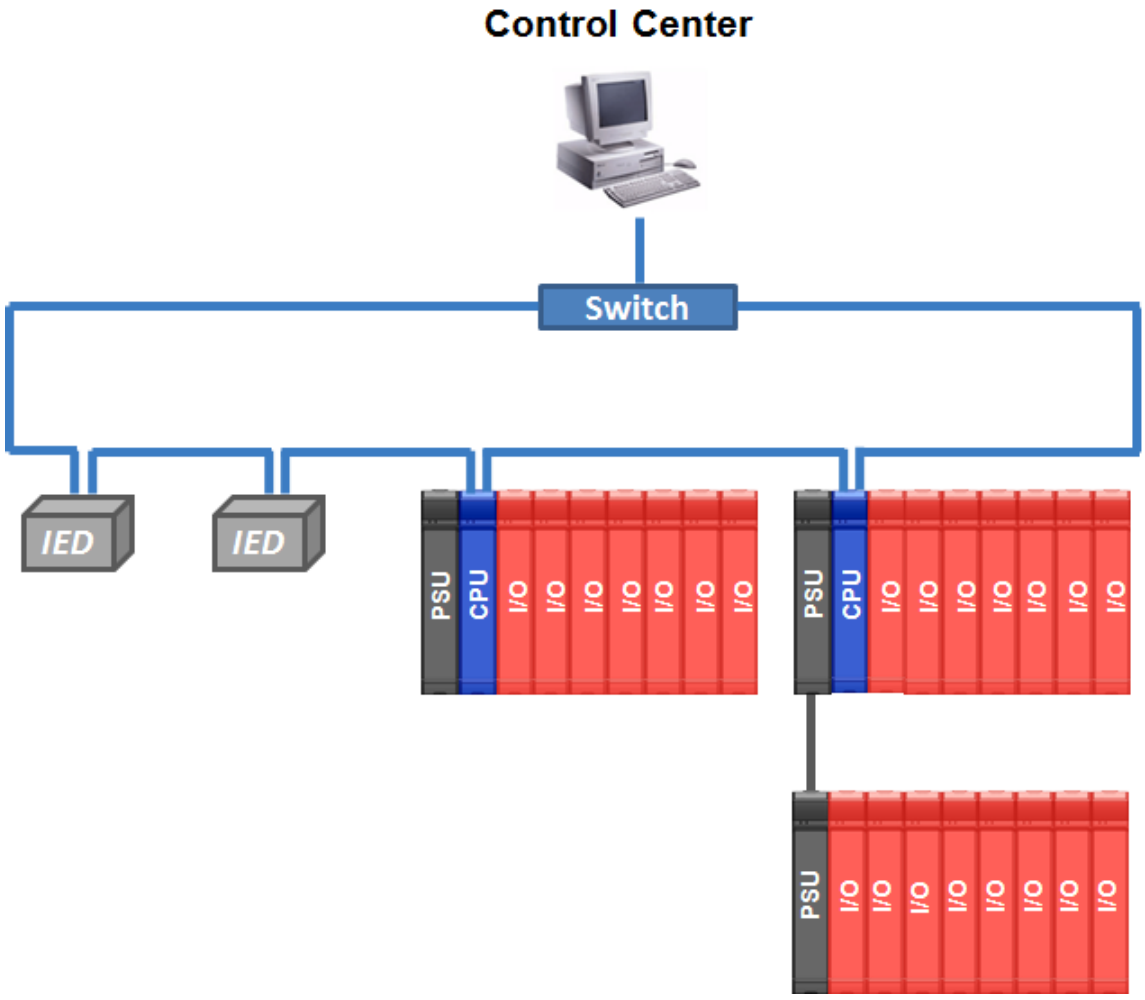

Figure 11: Ring Mode Ethernet Networks

4.3.9. Compatibility with Other Products

The Hadron Xtorm Series is compatible with all versions of MasterTool Xtorm, supporting bus expansion through the HX8300 or HX8320 module. With the UCP HX3040 model, it is possible to expand the architecture up to 16 racks (1 main rack and 15 expansion racks) using the bus expansion functionality. In this case, the maximum limit of modules counted among all expansion racks cannot exceed 80 modules.

In addition, it is also possible to build a hybrid architecture using the Hadron Xtorm Series bus expansion to interconnect with a Nexto or Nexto Jet Series rack. In the following figure, this proposed architecture can be visualized.

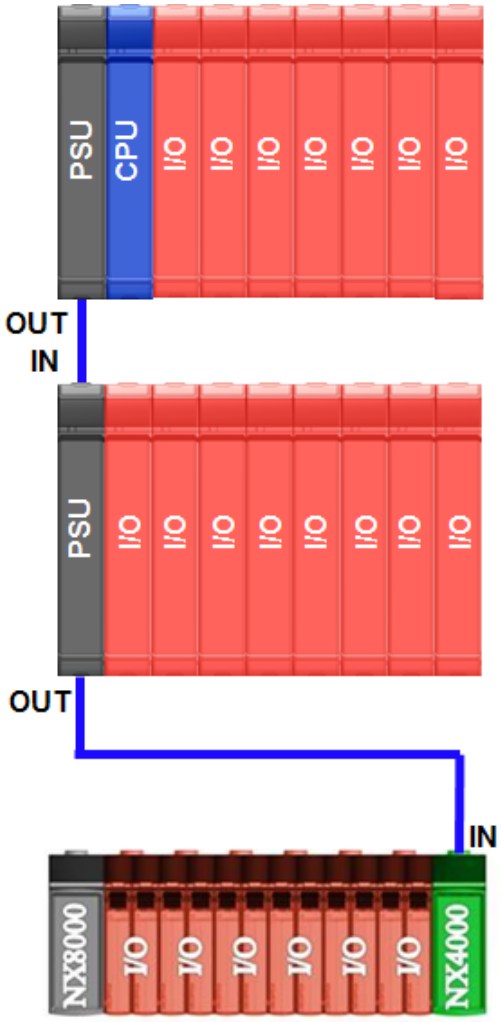

Figure 12: Compatibility with Other Products

ATTENTION

For mixed architecture, only Nexto Series I/O modules are allowed. Other Nexto Series modules cannot be installed on Hadron Xtorm Series mixed expansion buses.

5. Physical Dimensions

The dimension of each Hadron Xtorm Series module can be found in the Technical Characteristics document of each module. The documents are listed in table 3.

The dimensions of the main modules are shown below, in mm.

5.1. Racks

5.1.1. 9-position Rack

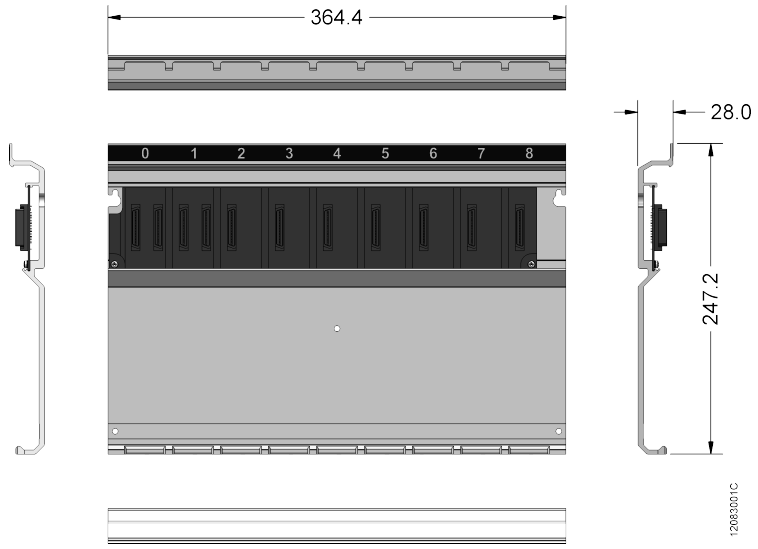

Figure 13: 9-Slot Backplane Rack

5.1.2. 18-position Rack

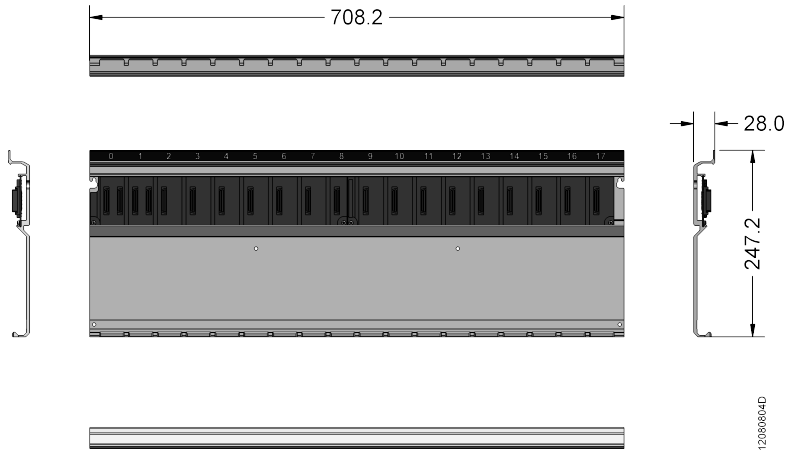

Figure 14: 18-Slot Backplane Rack

5.2. Modules

This module size is used by all other Hadron Xtorm Series modules. The figure illustrates the HX3040 CPU.

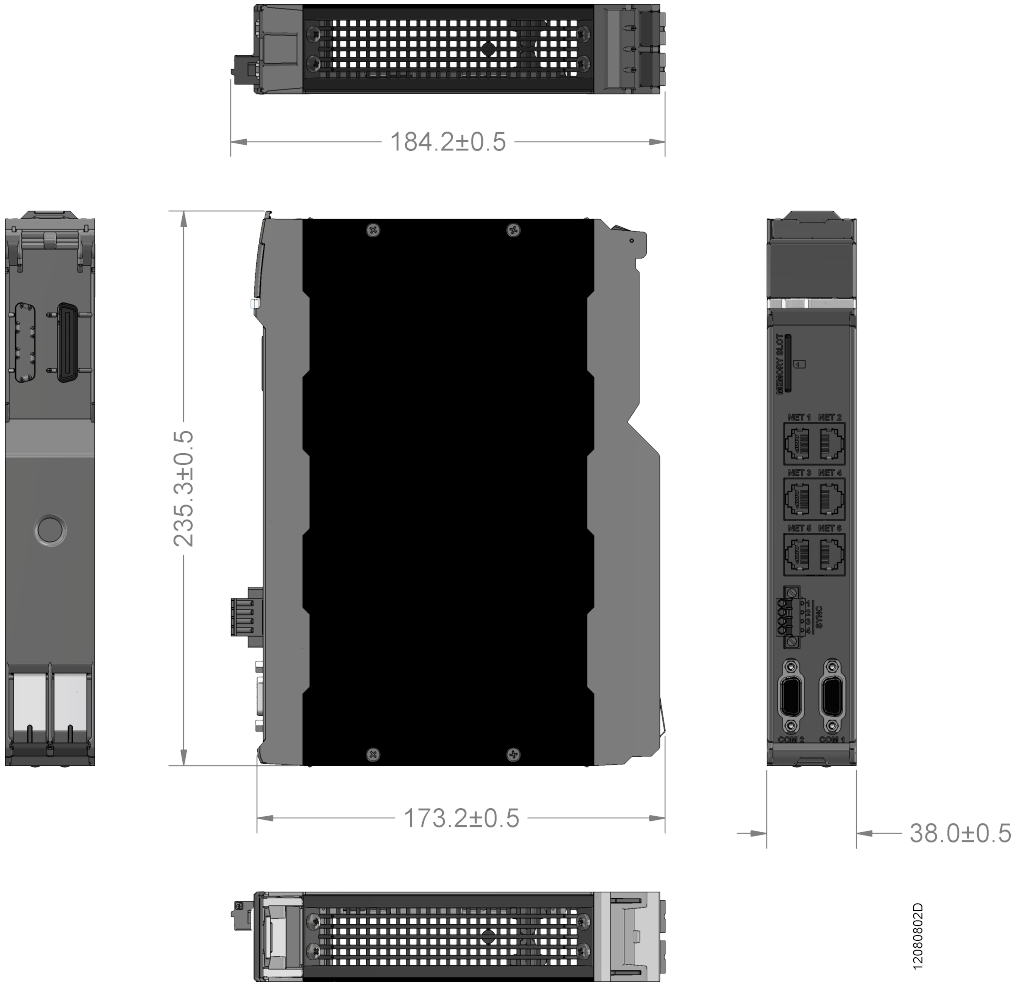

Figure 15: Module

6. Main Features

6.1. Robustness

The Hadron Xtorm Series design is extremely robust and allows the use in applications with harsh environments. Able to be installed in environments with presence of mechanical vibration and extended operation temperature, the Series is qualified for applications in power plants, in powerhouses or near large gates. Finally, it has high requirements for immunity to electrostatic discharges and electromagnetic noise commonly present in these applications. Its design offers these possibilities, without compromising installation and maintenance procedures.

6.2. High Speed Bus

Hadron Xtorm Series architecture features a state-of-the art bus based on Ethernet 100 Mbps. The high throughput allows the updating of large amounts of inputs in a short period of time. The modules are automatically addressed and identified avoiding eventual errors during the application configuration and field maintenance. The bus provides special features that allow CPU redundancy in the same rack, among other features.

- Automatic addressing and identification module
- Hot swapping
- Serial Bus based on Ethernet 100 Mbps
- Time synchronization for I/O updating or precise time stamp
- Single chip hardware solution

6.3. Hot swap

The hot-swap feature allows the modules replacement without the system powering off. The CPU tracks the whole process and the modules can be replaced whenever necessary.

6.4. High Availability

Hadron Xtorm Series offers several different redundancy architectures, where CPUs, Power Supplies and Network Interfaces can be mounted in a redundant application. Through this flexibility, the system can be adjusted from simple systems with no redundancy to complex and critical applications where high availability is essential.

6.5. Advanced Diagnostics

Each module contains its own diagnostics. CPUs, Network Interfaces, Power Supplies and I/O modules show several diagnostics. Each module has a multifunctional display to report its status. In addition, each module offers a button on its front to provide different diagnostic information for maintenance staff. These diagnostics can be monitored through displays or via the configuration tool. Examples:

- Module placed in the wrong position in the rack
- No power supply
- Short circuit in the outputs
- No need for configuration for modules in normal operation
- Tag view and I/O descriptions of the IO
- IP address view

6.6. Capabilities

In Hadron Xtorm Series, the largest rack can hold up to 18 modules. The combination between the chosen modules must not exceed the current limit of the rack power supply. The current consumed by each Hadron Xtorm Series module from the bus is found in the Technical Characteristics document. The user may check the MasterTool Xtorm “Configuration and Consumption” functionality in order to get information about the following items: architecture assembly with the desired modules, current consumption of each module, total current required for the selected modules and the value provided by the power supply. With this architecture, a single CPU can control up to 512 I/O points through only one rack. The user can expand up to 16 racks (main rack + 15 expansion racks) using the bus expansion functionality. In this case, the maximum limit of modules, counted among all the expansion racks and the main rack, is 100.

6.7. CPU Programming & Firmware Update

Hadron Xtorm Series allows CPU programming and firmware updating via CPU's Ethernet port. This approach offers some features such as:

- Multifunctional Ethernet port used for program share, peer to peer data exchange, third-party device protocol at the application layer, network variable data exchange, etc.
- Direct access to CPU local variables
- Remote access via Ethernet interface
- Firmware update via Ethernet interface

7. Software Characteristics

7.1. HD8500 – MasterTool Xtorm

MasterTool Xtorm is the software for configuration, programming, simulation, monitoring and debugging of the Hadron Xtorm Series. Based on the concept of integrated tool, MasterTool Xtorm provides flexibility and ease of use, allowing users to import data from electronic spreadsheets for module parameterization or variable mapping in the communication protocols available in the CPU.

Among the integrated protocols and services, there are MODBUS RTU, MODBUS TCP, DNP3, IEC 60870-5-104, IEC 61850 (MMS and GOOSE Server), time synchronization, and event grouping that can be graphically performed.

MasterTool Xtorm also offers all the editors defined in the IEC 61131-3 standard for application development: Structured Text (ST), Sequence Function Chart (SFC), Functional Block Diagram (FBD), Ladder Diagram (LD), Instruction List (IL) and Continuous Functional Chart (CFC). All editors have been specially developed to ensure the best choice for users depending on the application and their automation profile and technical culture.

Main Features:

- Programming languages based on IEC 61131-3
- Graphical editors for project and hardware configuration
- Object-oriented programming
- Simulation
- Integrated user documentation and help files
- Advanced diagnostics
- Visualization using the concept of tabs (Docking View technology)
- Integration of Logical Nodes (IEC 61850) with the IEC 61131-3 language
- Function library for hydropower plants and substations

7.1.1. IEC 61131-3 Programming Languages

MasterTool IEC XE offers all editors defined in the IEC standard for application development: Structured Text (ST), Sequential Function Chart (SFC), Function Block Diagram (FBD), Ladder Diagram (LD), Instruction List (IL) and Continuous Function Chart (CFC).

All editors were specially designed to ensure optimal handling. Ideas and suggestions from experienced users are incorporated into the development process.

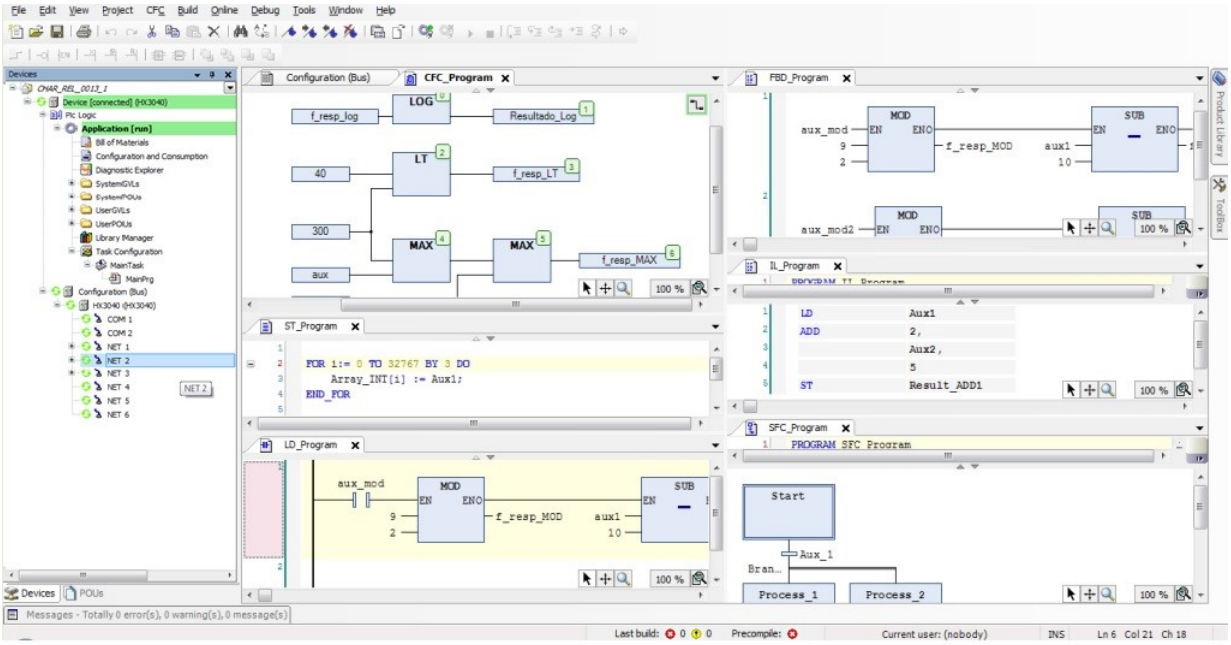

Figure 16: IEC 61131-3 Programming Languages

Some examples:

- When working in FBD, LD or IL you can freely switch between these editors
- Language elements can either be entered directly or dragged into the editor from a tool box
- HD8500 offers an intelligent input assistance and an extended IntelliSense functionality
- Standard language constructs (IF statements, FOR loops, variable classes, etc.) can be folded and unfolded in the text editors
- Language constructs are automatically created (IF ... END_IF)
- The SFC editor can either be used as defined in the standard or in a simplified version
- A comfortable time monitoring for steps as well as online diagnosis functionality is also available in the SFC editor

7.1.2. Editors for Project and Hardware Configuration

With the help of special editors, a project can be easily configured in MasterTool Xtorm. The graphical tool allows a fast and user-friendly way to configure the system. Additionally, the user has a complete view of the application architecture with the physical position and information of each module.

The configuration of network interfaces and standard communication protocols such as MODBUS, DNP3, IEC 60870-5-104, and the IEC 61850 protocol are integrated into the programming tool. This feature allows the user to define all configuration parameters in one place, without having to use different software tools.

If necessary, the user can use the ability to import data from spreadsheets for parameterization, retrieval, or comparison of project mapping tables by simply selecting and dragging the spreadsheet tables into the editors' configuration tabs.

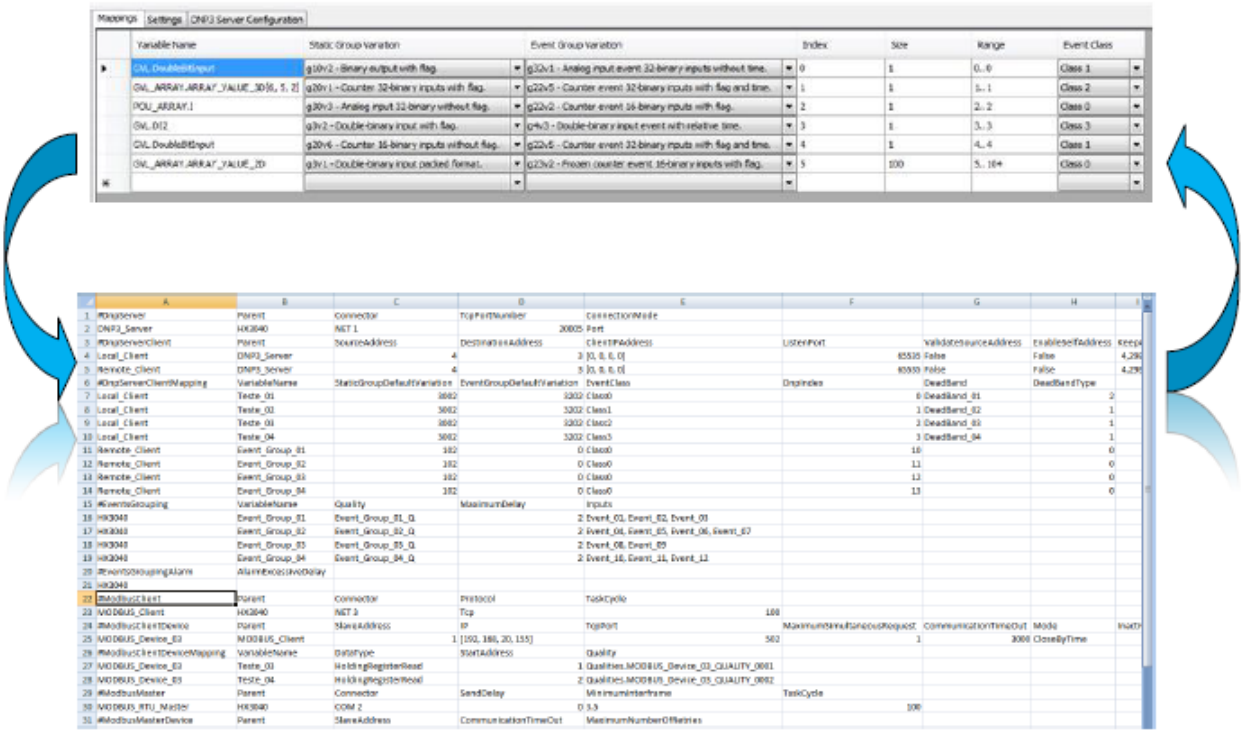

Figure 17: Editors for Project Configuration and Hardware Configuration

7.1.3. Object Oriented Programming

MasterTool Xtorm offers object-oriented programming with the known advantages of modern high-level languages such as JAVA or C++: classes, interfaces, methods, inheritance, polymorphism, etc. Object-oriented programming offers great advantages to the user, for example when you want to reuse existing parts of an application, or when working on an application with several developers.

7.1.4. Online, Debugging and Commissioning Features

The code generated from the application is sent to the device with a single mouse click. Once MasterTool Xtorm is online, several important functions are available for fast and efficient debugging, as well as for testing and commissioning.

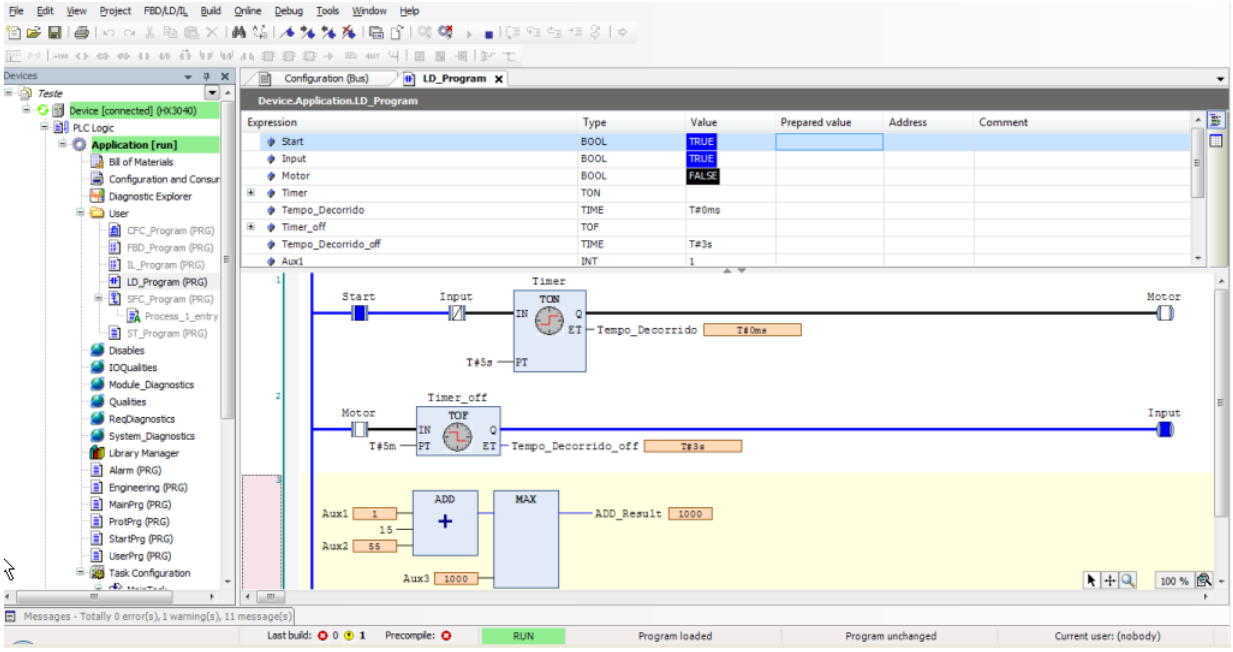

Figure 18: Online, Debugging and Commissioning Features

The values of declared variables, for example, are displayed in the program code. These values can be changed or forced without any difficulty. By defining breakpoints and traversing them through the line of code (step by step) errors can be easily detected. Breakpoints, in MasterTool Xtorm, can also be assigned to certain conditions to give more precision to the debugging process. In a single cycle operation, the user can follow the execution of the application through one complete cycle.

If the application is modified, only the changes are compiled, loaded and then activated, without the need to stop the controller and risk losing variable values. Changes to multiple POUs (Program Organization Units), variables or data types are also possible. This functionality is called Online Change.

Trace is a powerful feature that allows the user to analyze application data graphically. Thus, making it possible to easily obtain information such as trends and temporal dynamics of the application data.

7.1.5. Simulation

One feature that allows the user to evaluate and test various logics and algorithms is the simulation tool. This feature allows user applications to be designed and tested without the need for a connected RTU. This is also interesting for training, documentation, and evaluation of test cases. Since this is a simulator, naturally there may be some limitations in application development compared to the real RTU.

7.1.6. User documentation & Help Files

Since programming the Remote Terminal Unit according to IEC 61131-3 languages is a complex task, MasterTool Xtorm offers an extensive help file with various tips and descriptions to guide and serve as a first troubleshooting database for the user in creating logic code or using the software features. This help file is available in different languages, depending on the installation options.

MasterTool Xtorm also offers multiple language support, allowing the user to select their preferred language from the available options.

As part as user documentation, HD8500 can print out user application documents, like bill of materials (BOM), POUs and configuration parameters.

7.1.7. Advanced Diagnostics

One of the innovations of the Hadron Xtorm Series is extensive diagnostic support. This idea comes from the demands of extensive and complex applications, where the correct use of each piece of information is fundamental to maintain, solve and prevent potential problems. This feature is also present in MasterTool Xtorm where the user, while connected to a running CPU, may access complete diagnostic structures through monitoring windows and web pages.

7.1.8. Docking View

Docking View technology allows the user to customize the MasterTool Xtorm environment, according to their personal needs. This feature provides a user-friendly user interface to maximize the experience with the software tool.

7.1.9. Integration of Logical Nodes with the IEC 61131-3 programming languages

In Mastertool Xtorm, for each IED configuration logic node (LN) assigned to the user project, the corresponding function block is automatically declared in the user logics development environment.

More details on configuration, descriptions and operation of the LNs are described in the Hadron Xtorm Series User Manual. However, it is recommended to read the IEC 61850 standard for better use of the presented logics.

8. Environmental Conditions

The Hadron Xtorm Series modules meet the environmental specifications described in the table below.

Operating temperature	-5 to 60 °C
Storage temperature	-25 to 75 °C
Relative Humidity	5% to 96%, non-condensing

Table 1: Environmental Specifications

9. Standards and Certifications

	IEC 61131-2	CE RoHS
CPUs – Central Processing Units		
HX3040	✓	✓
Input Modules		
HX1100	✓	✓
HX1120	✓	✓
HX6000	✓	✓
HX6020	✓	✓
I/O Mixed Modules		
HX6065	✓	✓
Output Modules		
HX2200	✓	✓
HX2300	✓	✓
HX2320	✓	✓
Power Supply Module		
HX8300	✓	✓
HX8320	✓	✓
Racks		
HX9001	✓	✓
HX9002	✓	✓
Accessories		
HX9102	✓	✓
HX9405	✓	✓
HX9401	✓	✓
HX9402	✓	✓

Table 2: Certifications

Notes:
IEC 61131-2: Refers to IEC 61131-2:2007, chapter 8 and 11.
CE: This refers to directives 2011/65/EU (RoHS), 2014/35/EU (LVD), and 2014/30/EU (EMC).

10. Manuals

For additional information about the Hadron Xtorm Series, other documents (manuals and technical characteristics), in addition to this one, may be consulted. These documents are available in their latest revision at www.altus.com.br.

Each product has a document called Technical Characteristics where you can find the characteristics of the product.

The following documents are recommended as a source of additional information:

Code	Description	Language
CE108804	MasterTool Xtorm Technical Characteristics	English
CT108804	Características Técnicas MasterTool Xtorm	Portuguese
CS108804	Características Técnicas MasterTool Xtorm	Spanish
CE123000	Hadron Xtorm Series Technical Characteristics	English
CT123000	Características Técnicas Série Hadron Xtorm	Portuguese
CS123000	Características Técnicas Serie Hadron Xtorm	Spanish
CE123100	CPU 6 ETH, 2 SERIALS, IRIG-B, RED Module Technical Characteristics	English
CT123100	Características Técnicas do Módulo UCP 6 ETH, 2 SERIAIS, IRIG-B, RED.	Portuguese
CS123100	Características Técnicas del UCP 6 ETH, 2 SERIALES, IRIG-B, RED.	Spanish
CE123701	Hadron Xtorm Series Backplane Racks Technical Characteristics	English
CT123701	Características Técnicas dos Bastidores da Série Hadron Xtorm	Portuguese
CS123701	Características Técnicas de los Bastidores de la Serie Hadron Xtorm	Spanish
CE123200	Redundant Power Supply 60 W Modules Technical Characteristics	English
CT123200	Características Técnicas dos Módulos Fonte de Alimentação Redundante 60 W	Portuguese
CS123200	Características Técnicas delos Módulos Fuente de Alimentación Redundante 60 W	Spanish
CE123300	Módulo 32 DI 125 Vdc w/ event log Module Technical Characteristics	English
CT123300	Características Técnicas do Módulo 32 ED 125 Vdc c/ registro de eventos	Portuguese
CS123300	Características Técnicas del Módulo 32 ED 125 Vdc c/ registro de eventos	Spanish
CE123400	16 SD Relay 125 Vdc w/ CBO Module Technical Characteristics	English
CT123400	Características Técnicas do Módulo 16 SD Relé 125 Vdc c/ CBO	Portuguese
CS123400	Características Técnicas del Módulo 16 SD Relé 125 Vdc c/ CBO	Spanish
CE123310	16 AI Voltage/Current Module Technical Characteristics	English
CT123310	Características Técnicas do Módulo 16 EA Tensão/Corrente	Portuguese
CS123310	Características Técnicas del Módulo 16 EA Tensión/Corriente	Spanish
CE123313	AC Measurement / 4O Voltage/Current Mixed Module Technical Characteristics	English
CT123313	Características Técnicas do Módulo Misto Medição AC / 4S Tensão/Corrente	Portuguese
CS123313	Características Técnicas del Módulo Mixto Medición AC / 4S Voltaje/Corriente	Spanish
CE123311	8 AI RTD Module Technical Characteristics	English
CT123311	Características Técnicas do Módulo 8 EA RTD	Portuguese

Code	Description	Language
CS123311	Características Técnicas del Módulo 8 EA RTD	Spanish
CE123901	Hadron Xtorm Series Connectors Technical Characteristics	English
CT123901	Características Técnicas dos Conectores da Série Hadron Xtorm	Portuguese
CS123901	Características Técnicas de los Conectores de la Serie Hadron Xtorm	Spanish
CE123900	Rack Connector Cover Technical Characteristics	English
CT123900	Características Técnicas da Tampa para conector de bastidor	Portuguese
CS123900	Características Técnicas de la Tapa para conector de bastidor	Spanish
MU223600	Hadron Xtorm Utilization Manual	English
MU223000	Manual de Utilização Hadron Xtorm	Portuguese
MU223601	Hadron Xtorm DNP3 Server Device Profile Document	English
MU223602	Hadron Xtorm DNP3 Client Device Profile Document	English
MU223603	IEC 60870-5-104 Server Device Profile Document	English
MU223604	Hadron Xtorm IEC 60870-5-104 Client Device Profile Document	English
MU223605	Hadron Xtorm IEC 61850 Server Device Profile Document	English
MP399609	MasterTool IEC XE Programming Manual	English
MP399048	Manual de Programação MasterTool IEC XE	Portuguese

Table 3: Related Documents