The Life of Energy

6049-E70

SYNERGY
SYSTEMS & SOLUTIONS

HUSKY™
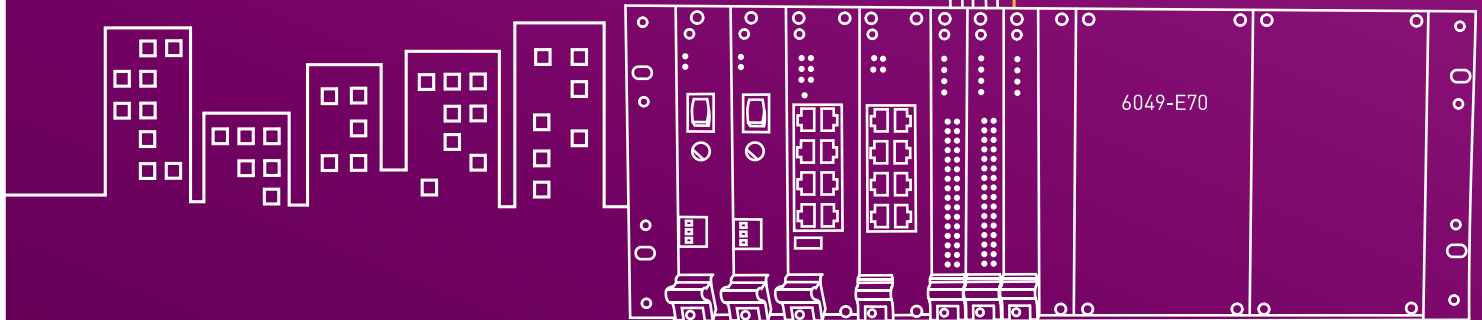
HUSKY™

HUSKY™ RTU 6049-E70 is Synergy Systems & Solutions' offering for data acquisition and control solutions in energy generation, transportation, and distribution systems. RTU 6049-E70 has a large installation base of more than 1000 locations in Railways, EHV sub-stations,solar and wind farms, oil & gas pipelines. The RTU design incorporates latest technology to achieve high-end performance and reliability.

HUSKY RTU 6049-E70 has been designed to address data acquisition and control requirements of various industry segments. The RTU follows a scalable architecture that's expandable while maintaining flexibility and adaptability to suit different application scenarios.

WHAT'S IN A NAME?
Husky is a breed of dogs normally found in the arctic region, and is used for driving sledges. It is a friendly, strong, powerful, reliable breed that is well adapted to the harsh environment of the arctic. HUSKY RTU imbibes these qualities, hence the name.

PRODUCT FEATURES

- *Telemetry Station, Data Concentrator, Gateway, PLC Functionality*

- *Distributed Processing with "Local" Intelligence*

- *High Speed Optical I/O Bus for Distributed I/O*

- *IEC61850 Ready – Integration with Station Bus*

- *Wide Variety of Industry Standard and Proprietary Protocols*

- *Fault-tolerant Redundancy at Multiple Levels*

- *Local Fault Diagnostics on all Modules*

- *Fibre Optic Ethernet for Operation in Electrically Harsh Environments*

- *Expandable Communication Interfaces - Serial and Ethernet*

- *IEC61131 Logic Programming*

- *Unified Programming and Diagnostic Software – HUSKY Studio*

- *Web-interface for Monitoring of RTU Functions*

The RTU can be used as a slave/server for transmission of collected data to remote control centres, as well as a master/client for use in data concentrator applications.

The in-house knowledge and expertise of legacy products positions HUSKY as an ideal choice for retrofit applications. HUSKY provides an optimal cost-effective solution in upgrading legacy systems to meet current and future requirements.

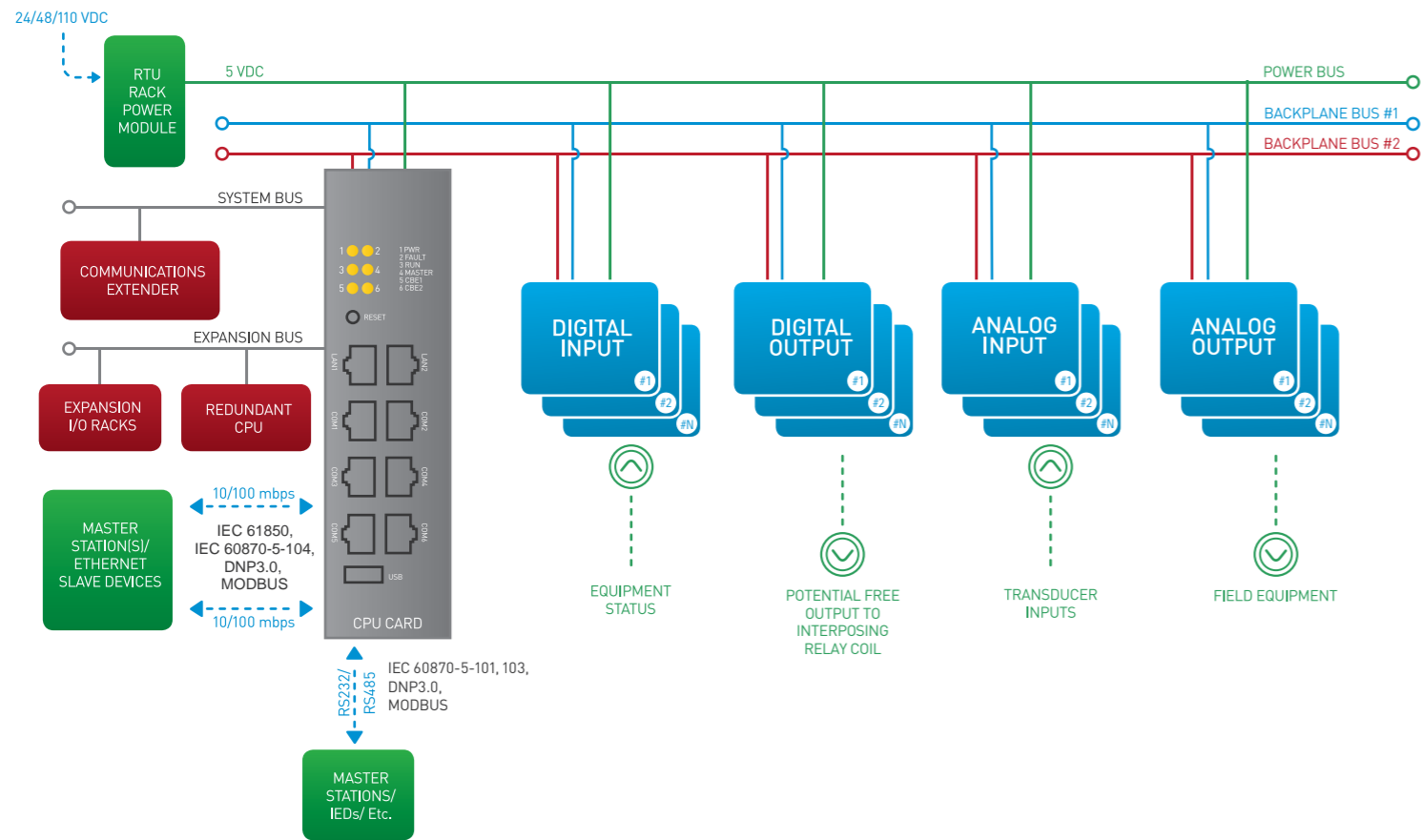RTU 6049-E70 consists of the following components:
- Processor Modules (with suitable chassis backplane)
- Power Supply Modules
- Input/Output Modules
- Specialty Communication Modules
- Real-time operating system
- Protocol stacks for comm. with control centres & IEDs

The RTU equipment is designed for mounting in 4U-high, 19" sub-racks. Choice of I/O modules with varying densities, and chassis backplanes are available for optimal configuration of different application needs. Full-size backplane (19"-subrack) supports 16 I/O modules, while smaller backplanes
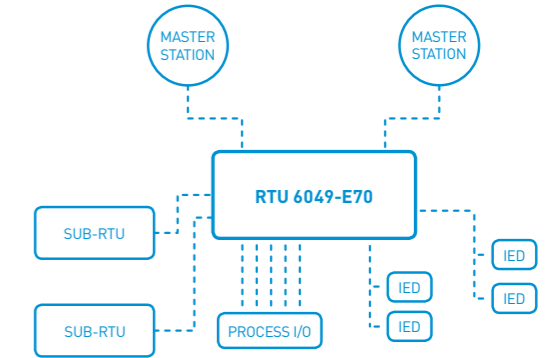
accommodating 5 I/O slots are also available. The RTU can be configured to suit I/O requirements of medium to high range applications, through addition of I/O modules and expansion racks. All racks have generic I/O slots, which can be used for any of the supported I/O modules. This architecture aids in flexibility of system design while keeping costs to the optimum.

The core of the RTU design is the processor (CPU) module which executes all the software functions of the RTU. The software architecture is based on a real-time operating system for execution of time-critical tasks in a deterministic manner. Further, using hardware-assisted features like direct memory access (DMA), some of the time-consuming tasks are offloaded by the CPU to its peripherals.

24/48/110 VDC

RTU RACK POWER MODULE

5 VDC

POWER BUS
BACKPLANE BUS #1
BACKPLANE BUS #2

SYSTEM BUS

COMMUNICATIONS EXTENDER

EXPANSION BUS

EXPANSION I/O RACKS

REDUNDANT CPU

10/100 mbps

MASTER STATION(S)/ ETHERNET SLAVE DEVICES

IEC 61850, IEC 60870-5-104, DNP3.0, MODBUS

10/100 mbps

1 PWR
2 FAULT
3 RUN
4 MASTER
5 CBE1
6 CBE2

RESET

CPU CARD

USB

RS232/ RS485

IEC 60870-5-101, 103, DNP3.0, MODBUS

MASTER STATIONS/ IEDs/ Etc.

DIGITAL INPUT
#1 #2 #N

EQUIPMENT STATUS

DIGITAL OUTPUT
#1 #2 #N

POTENTIAL FREE OUTPUT TO INTERPOSING RELAY COIL

ANALOG INPUT
#1 #2 #N

TRANSDUCER INPUTS

ANALOG OUTPUT
#1 #2 #N

FIELD EQUIPMENT

I/O ARCHITECTURE

The I/O modules provide the field interface for the RTU for monitoring and control of process signals. These modules can be inserted in the 4U sub-rack at any of the designated I/O slots. Through the use of expansion racks more I/Os can be added to the RTU. A single CPU processes all the I/Os of the racks.

The main rack of the RTU consists of the processor module, which interfaces with the local rack I/O as well as the expansion rack I/O over high-speed digital links. The expansion racks are connected to the main rack over a dual-redundant bus. Each expansion rack is fitted with an I/O scanner module, which performs its local rack I/O scanning, and handles communications with the CPU over the I/O expansion bus. The I/O modules exchange I/O data, Sequence of Events (SoE), and diagnostic/configuration information of the modules/channels. All modules are synchronized with the CPU clock over the I/O bus.

The local I/O bus is based on the popular and rugged CAN bus. It has been widely used in industrial control and automotive industry. CAN bus provides high immunity to external noises present in an industrial environment, and has built-in error handling and fault confinement features. Therefore failure or malfunction of an I/O module does not cause failure of the entire bus. Using the priority-based messaging feature of CAN bus data like I/O status are transferred to the CPU on higher priority. The local I/O bus operates at 1Mbps.

The I/O expansion bus is based on the industry-standard ARCNet protocol. ARCNet is a deterministic, reliable bus with proven track record. The expansion bus can operate at a maximum speed of 10Mbps. Using the time-deterministic nature of the ARCNet protocol, all I/O is scanned by the CPU within a fixed time, called the RTU I/O scan cycle. Typical I/O scan rates achieved by the RTU is 10 msecs.

Remote I/O can be connected to the RTU using the expansion bus. For distances up to 15m, the bus can be operated at the maximum speed. For longer distances the bus can be operated at a speed of 2.5Mbps. For plant wide distribution of I/O, optical fibre network is also supported.

Alternately, multiple RTUs can be connected in peer-to-peer mode with distributed intelligence.

I/O MODULE ARCHITECTURE

All I/O modules are designed with an onboard dedicated 32-bit microcontroller. This aids in faster I/O scanning and maintaining of time-stamps as close to the field interface as possible. Further, I/O module specific intelligence is offloaded by the CPU to these microcontrollers, thereby alleviating the load on the main processor.

While interfacing with field signals, all I/O modules provide a minimum of 1kV isolation between the field and the internal logic. Further, all field signals that enter the I/O modules are protected against transients. Module-specific input protection, if any, is also provided to prevent damage to the module in case of inadvertent inputs or wrong wiring.

Hot-swap feature of the I/O modules allows field maintenance and troubleshooting without affecting overall system downtime.

I/O modules with dedicated local intelligence provide many additional features apart from standard telemetry functions.

DIGITAL INPUTS

The digital input module is a multi-functional module that provides more features than basic reporting of binary states. The digital input module combines the functionality of (Sequence of Events) SoE module, pulse counter and digital measurands. Digital input module has an onboard processor that timestamps the data precisely at the occurrence of the event. This eliminates the requirement of special SoE modules for capturing events with 1 msec resolution. Each channel is individually configurable with Input Filter and "Data Inversion Reporting". Also chatter filter can be specified which is applicable to module as whole. DI module supports definition of 1-bit and 2-bit inputs with transient state suppression.

The module also provides facility to configure channels as pulse counters. Pulse counting of up-to 1kHz is supported by the module. Channels can be configured for Form-A, Form-B type pulses. Applications like Energy Accumulation, that requires counting of pulses provided by Energy Meter, does not require any special module thereby providing more value for the investment.

The module can also be configured to combine multiple channels and decode data in the form of digital measurands, eg. BCD. Group of 4 channels can be configured for single digit BCD. Multiple groups can be combined together to form BCD up-to 8 digits.

DIGITAL OUTPUTS

Digital output module provides true Select-Before-Execute (SBE) functionality by employing feedback hardware that monitors the circuitry for any malfunctions. When a Select command is received by the module, the specified channel is selected by the module by activating the corresponding circuit. The module then monitors the feedback of the circuit and if found healthy, reports success to master. Once the channel is selected, Execute command can be issued to the module. Upon receiving the Execute command, the module compares the specified channel with the channel already selected in the module. It then scans the feedback circuit of all the channels to ensure that only specified channel is selected. In case of hardware malfunction, error is reported to the master. If hardware circuitry is found healthy, command is executed by the module to the specified channel. The Execute command has its own feedback circuit which is monitored by the module for any malfunctions. If feedback is received, success is returned to the master.

The module can be configured in either SBE mode or direct operate mode. In case of direct operate mode, each channel can be configured as pulse or latch providing mixed functionality to suit the application requirements. Single module can be used in applications requiring pulsed outputs for field equipments and latched outputs for local MIMIC/annunciation displays. Duration of pulsed outputs can be controlled either through user configuration or by a master station command parameter.

A channel configured in Pulse mode can be configured to generate pulse train with user-specified pulse duty cycle.

ANALOG INPUTS

Analog Input module provides different input ranges to suit most types of applications. Each channel is individually configurable for voltage and current (via hardware jumpers) and each channel can be further configured for different input ranges to suit the application requirement. Input ranges are configurable from Husky Studio.

The module features two precision low-temperature drift reference circuits which are used for automatic self-calibration of the analog front-end. Variations in performance of the analog circuitry due to temperature changes are thus compensated by the module, thereby

I/O MODULE ARCHITECTURE

delivering the guaranteed accuracy of measurements. A calibration out of range alarm is also provided by the module, when the variations in readings are beyond the limits of compensation.

All channels also feature 50/60Hz noise rejection for eliminating errors due to AC interference, etc. This feature can be enabled/disabled for the module by the user.

Each channel of the module is individually configurable for low and high alarm, deadband and "Deadband Around Zero". SoE can be generated on individual channel on any criteria violation. Each channel can also be configured for alarm generation on ROC (Rate of Change). ROC alarm can be raised either on Over Limit or Under Limit within the specified time period.

AC ANALOG INPUTS

AC analog input modules all direct connection of VT/CT inputs for measuring electrical parameters in 1-phase or 3-phase power networks. The module allows for transducerless operation. The in-built digital signal processor on the module computes voltage, current, active power, reactive power, frequency, power factor, etc. from the connected inputs. These computed variables are transferred to the CPU over the local I/O bus.
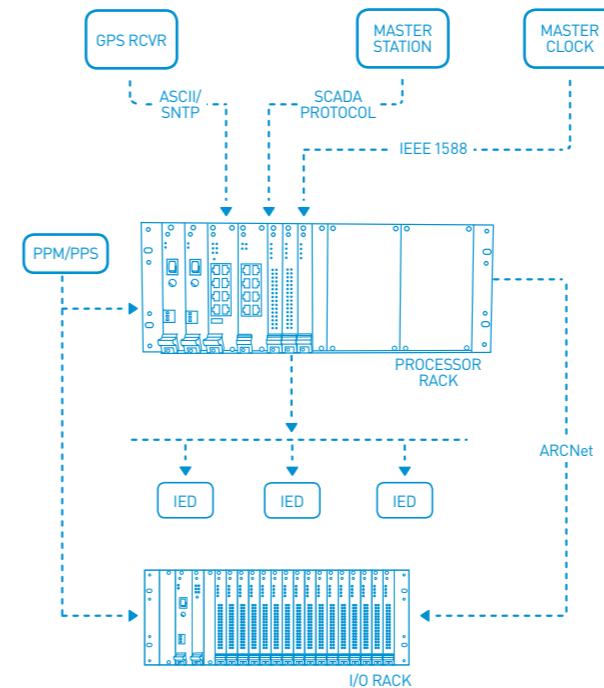
ANALOG OUTPUTS

Analog output modules provide selectable voltage/current outputs for controlling process equipment. Each output channel is individually selectable between voltage and current outputs, and can be programmed for different output ranges.

For current outputs, open-loop and loop-short sensing is provided, and is reported to the CPU through channel fault indications. Current loop voltage (up to 24VDC) is provided externally to the module.

As an optional feature analog output module supports the functionality of reading the output values, for monitoring the outputs.

TIME SYNCHRONIZATION

GPS RCVR
MASTER STATION
MASTER CLOCK
ASCII/ SNTP
SCADA PROTOCOL
IEEE 1588
PPM/PPS
PROCESSOR RACK
ARCNet
IED   IED   IED
I/O RACK

The RTU's real-time clock (RTC) can be time synchronized from an external master clock like a GPS receiver over SNTP or serial-based (E.g., NMEA 0183) protocols. The RTU also supports time synchronization messages provided by SCADA protocols like IEC 870-5, DNP3.0, etc. Slave devices connected to the RTU can be time synchronized by the RTU using its RTC as the time base.

HUSKY RTU supports up to eight time sources with various input possibilities including the above mentioned sources as well as IEEE 1588 master clock, and 1PPS/PPM pulse inputs. The time sources can be assigned different priorities wherein, if a higher priority clock is not present, then the RTU uses a lower priority clock to synchronize itself. Status of individual master clocks are available under system variables, which can be monitored over any master station protocol or using HUSKY Studio. Receiver-specific options like time zone offset, poll interval, and clock timeout are configurable.

The RTC operates using a temperature controlled crystal oscillator (TCXO) which enables the RTU to maintain a time accuracy of ±1ppm. The RTU clock data is stored in battery-backed non-volatile memory.

SOFTWARE ARCHITECTURE

REAL-TIME OPERATING SYSTEM

HUSKY RTUs employ a real-time operating system (RTOS) to deliver real-time response required by process control and automation industry.

The RTOS provides include powerful pre-emptive real-time performance with optimized context switching to deliver real-time guaranteed response times, required for process control systems. With features like guaranteed interrupt service latency times, small size, highly configurable core and direct access to CPU core makes it an ideal choice of RTOS for HUSKY.

A configurable RTOS core ensures that only required components are built into the RTU kernel thereby increasing system security, reliability and performance. With its message queuing system, it allows multiple RTU components to exchange information in a true real-time environment.

With an embedded TCP/IP stack and optimized file system, the RTU provides convenience of a modern PLC and traditional RTU in a single package.

NON-VOLATILE MEMORY

RTU 6049-E70 supports two types of non-volatile memories - battery-backed RAM and NAND flash.

The battery-backed RAM is used for storing real-time clock information, retentive memory tags, and events collected by the RTU. Events acquired by the RTU are therefore not lost in case of power failure, and transmitted to the master stations on restoration of power. A supervisory circuit protects the RAM contents from being corrupted during power off conditions. A battery low alarm is provided for monitoring the battery status.

Flash memory is used by the RTU to store application image, user configuration, programmed logics, log files, and other file-like data (Disturbance Records, Metering Profiles, etc.) it may acquire from other devices. Special Flash file system with wear-levelling algorithm provides optimized use of the flash memory and speeds up the flash access prolonging the usable life of the flash device.

For special applications, higher capacity flash memory can be provided.

RTU SOFTWARE ARCHITECTURE
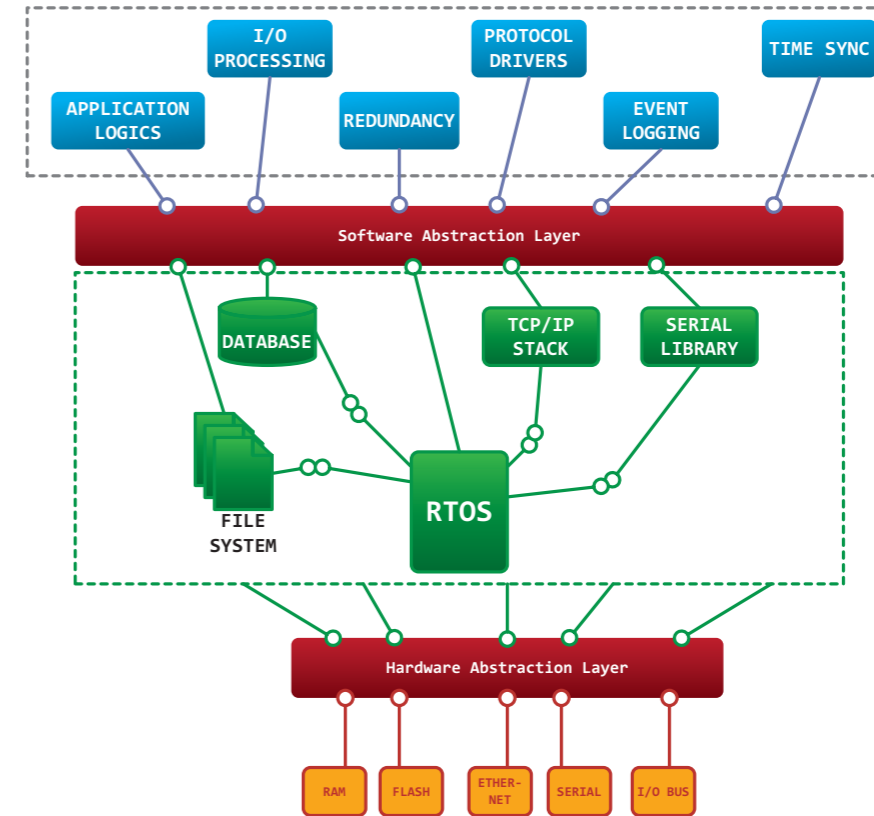
SYSTEM REDUNDANCY

RTU 6049-E70 supports redundancy of the following functions

- Rack power supplies – Supports installation of two power supplies in the same rack for redundant operation
- Processor module (incl. communication extender modules)
- Communication channels towards master stations and IEDs
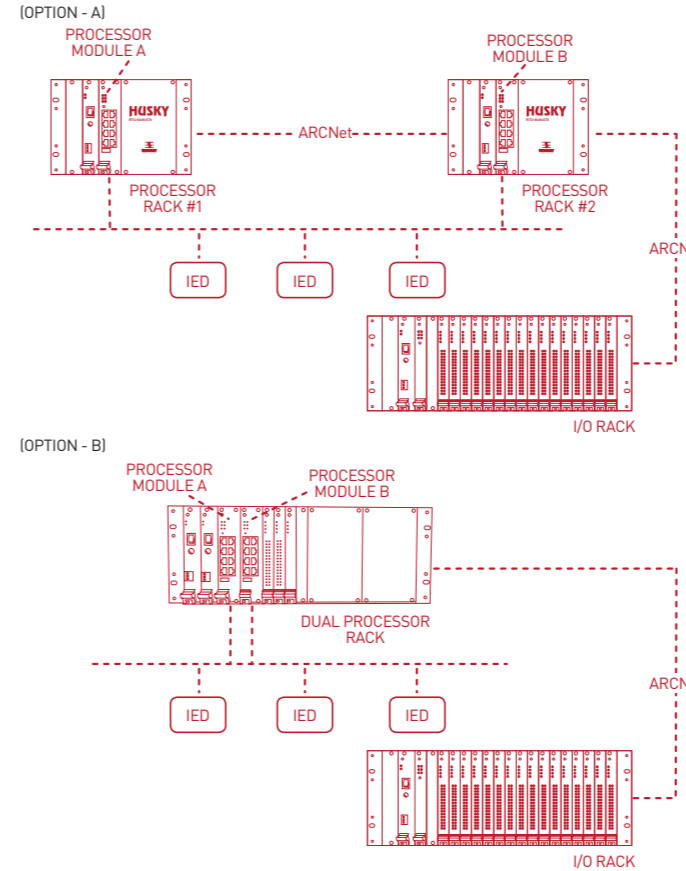- I/O expansion bus

> Fault Tolerant Redundancy at every level to meet requirements of mission critical applications.

PROCESSOR REDUNDANCY

RTU 6049-E70 supports dual redundancy of the processor modules by having a master-standby mechanism. The two processor modules are installed in separate processor racks which can house the processor and its communication modules. For processor redundancy, the communication modules are duplicated for each CPU, in other words, two identical racks are set-up with the same set of hardware.

Alternately, two CPUs can be inserted in the same rack, sharing the PSU, I/O bus. This option is possible using the chassis E70-CHS-005. Use of communication extender modules is not possible in this case.

Both the processors are interconnected through the ARCNet expansion bus. One of the processor modules assumes the role of the master CPU, while the other assumes the standby role. The master CPU performs all RTU functions including I/O scanning, communications, logic execution, etc. The standby CPU monitors the master CPU, and assumes the master role, in case the master CPU fails. The master CPU synchronizes its memories with the standby CPU over the expansion bus.

(OPTION - A)

PROCESSOR MODULE A — PROCESSOR MODULE B

HUSKY — ARCNet — HUSKY

PROCESSOR RACK #1 — PROCESSOR RACK #2

IED   IED   IED

ARCNet

I/O RACK

(OPTION - B)

PROCESSOR MODULE A — PROCESSOR MODULE B

DUAL PROCESSOR RACK

IED   IED   IED

ARCNet

I/O RACK

COMMUNICATIONS REDUNDANCY

Redundancy of communication channel between RTU and external world (IEDs and master stations) can be enabled in the RTU via Husky Studio. Redundancy of communication channels is based on active-passive concept, wherein one of the two channels is used for active communications, while the passive one is used for periodic health check of the link. When RTU detects failure of the active communication channel, it switches over to the passive channel making it active.

EXPANSION BUS REDUNDANCY

The expansion bus used to connect additional processor and I/O racks is designed with dual redundant links. This provides a redundancy of the communication media between the racks. Both the links of the expansion bus are used simultaneously thereby having zero switchover time in case of loss of one of the links.

ARCHITECTURE

RTU 6049-E70 supports both serial-based and Ethernet-based communications on a variety of protocols. Communications can be for either acquisition of data from subordinate devices or transfer of information to a higher level system like SCADA. Further, peer-to-peer or horizontal communications can be performed by the RTU in case of multi-node architectures.

Both serial and Ethernet interfaces are available on the processor module itself. Additional interfaces can be added to the RTU through communication extender modules (CXMs). Up to four CXMs can be installed under a single processor. These modules are installed alongside the processor module in the processor rack and communicate with the processor over the backplane bus.

PROTOCOLS

With over 20 years of experience in control systems and with in house designed and developed SIRIUS SCADA system, HUSKY had the head-start in the protocol department. With a support for wide variety of protocols like IEC61850,

IEC870-5-10x, DNP 3.0, MODBUS, the RTU can be deployed in almost any process control system.

With support for multiple masters with partitioned database and support for redundant communication links, connectivity is assured. Multiple protocols can be configured on the CPU ports itself thereby eliminating the requirement of separate communication modules.

The RTU can be configured to act as protocol converter or data concentrator. It can collect data from subordinate devices and transmit to master stations on any of the supported protocols. With a powerful configuration editor, I/O mapping between different protocols is a breeze. This allows the RTU to collect data from IEDs like Energy Meters, Numerical Relays, Disturbance Recorders, Governor Controllers, Flow computers, Gas Chromatographs and Station Controllers. RTU 6049-E70 can provide a simplified solution by providing out-of-the-box connectivity solution. It can be used as a Bay Controller, Unit Controller or Station Controller depending upon the process requirements.

INTERFACES

RTU 6049-E70 supports traditional copper-based interfaces like RS232, RS485, 10/100-baseT Ethernet. Fibre-optic based Ethernet interface are also available on select CXM modules.

The RTU can also interface with PSTN leased-line or dial-up modems. Similarly, GSM/GPRS/CDMA modems can be interfaced for providing wireless connectivity to the RTU. AT commands can be setup in the RTU for configuring the modem settings.

REMOTE MANAGEABILITY

RTU 6049-E70 provides remote management features by providing an integrated browser based interface for managing the RTU from remote locations over the web. This service can be used for monitoring the current RTU status like diagnostics, fault records, etc. Configuration download/upload can also be performed through this interface.

HUSKY Studio can also operate over TCP/IP links. The same can hence be used for configuration and diagnostics if a TCP/IP link is available to the RTU from a remote location.

PASS THROUGH CONNECTIVITY

RTU 6049-E70 can provide a transparent Ethernet-to-serial or Ethernet-to-Ethernet pass-through channel between a master station connected over TCP/IP and a subordinate device connected to the RTU over an RS232/RS485 or Ethernet port. This feature can be used by an operator at the master station to remotely manage the device without requiring a direct physical connection to the device. This feature can be enabled or disabled by the master station.

RTU 6049-E70 supports traditional copper-based interfaces like RS232, RS485, 10/100-baseT Ethernet. Fibre-optic based Ethernet interface are also available on select CXM models.

IEC 61850

IEC 61850, the latest standard for communications in substations, defines a data model of the substation domain and a set of services that operate on that data. This standard is now being adopted by other application domains also like wind power, hydro power. RTU 6049-E70 supports both IEC 61850 MMS client and server functions.

Using the IEC 61850 client service, the RTU can be installed in a substation for collecting data from various IEDs on IEC 61850 and transfer it to a master station on protocols like IEC 870-5, DNP3.0. In this scenario, the RTU acts as a gateway for the substation providing access to the modern and traditional IEDs in a substation.

The IEC 61850 server service can be used for transfer of RTU's I/O and any IED data to an IEC 61850 client device using the standard data models. This feature enables integration of legacy IEDs and other sources of information in a substation to a modern substation automation platform.

HUSKY also supports GOOSE messaging for horizontal data exchange within a substation.

HUSKY Studio supports import/export of IEC 61850 Substation Configuration Language (SCL) files for fast and easy configuration of the RTU substation database.

LOCAL HMI

CONTROL CENTRE

IEC 870-5/ DNP3.0

IEC 61850 STATION BUS

IED

IED

IED

IED

FILED I/O
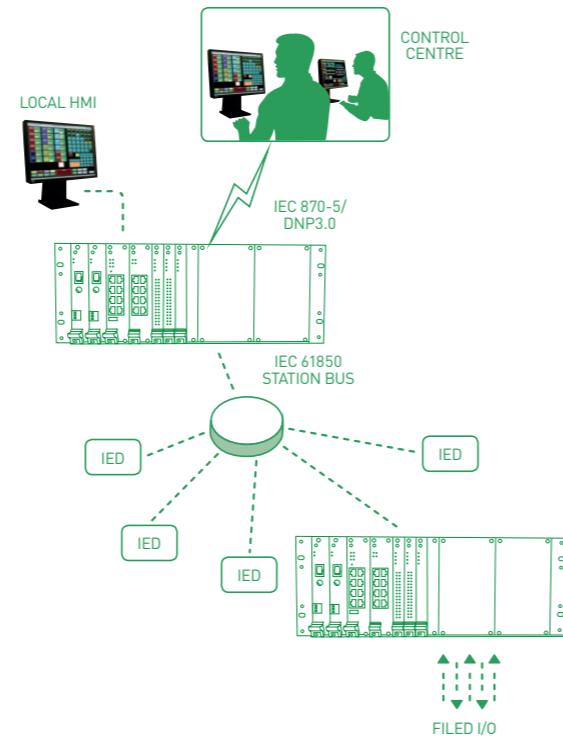
DATA CONCENTRATOR/GATEWAY

In legacy control systems many devices exist which perform a dedicated function and at best, could offer contacts for sensing through a separate local RTU for remote monitoring purpose. This method requires large amount of wiring for implementing remote monitoring and control.

With the advent of Intelligent Electronic Devices (IEDs), which are microprocessor based, it is now possible to gather all data from such dedicated devices by simply communicating with these devices over a communication channel. Many such IEDs supplied by different vendors may exist at one utility. These IEDs communicate over different and often proprietary protocols. Therefore it necessitates installation of a central device whose role is to gather data from all such IEDs and then exchange this data with one or multiple master stations.

HUSKY RTUs can function as a data concentrator or gateway which can interface with the legacy devices and provide a uniform and standard interface towards the master stations.

HUSKY RTUs support the following data concentrator functions
○ Preserving quality of acquired values, if provided by the IED. In case an IED does not provide quality information, then the quality is marked as 'good' except when communication with the IED has failed.
○ Scaling of resolution of analog values to suit master station
○ Preserving time stamps of acquired information for SoE
○ Transfer of comm. status with IEDs to master stations.
○ Time Synchronization of IEDs.

A Data Concentrator seamlessly integrates both legacy and modern devices into large asset management networks.
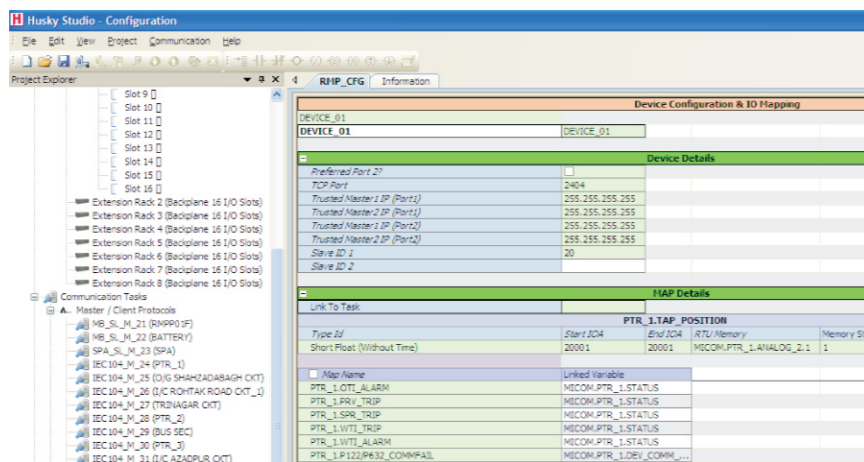
HUSKY STUDIO

HUSKY Studio is the unified RTU configuration, programming and diagnostics software. HUSKY Studio is a Windows-based application providing all RTU engineering and programming tasks under one application.

HUSKY Studio is a powerful configuration editor designed for Data Concentrators where large amount of data is transferred across protocols using IO maps. Features like variable naming, filtering allow configuration engineer to map the data across protocols by referring to user friendly names. Built in Event Viewer allows you to view different events, with millisecond timestamp, in the RTU itself.

HUSKY Studio also supports IEC61850 Substation Configuration Language (SCL) and can import SCL files (.CID, .ICD, .SCD) and create the IEC61850 database maps automatically. This helps in rapid and less error-prone system deployment.

Commands can also be issued directly from the variables view. The commands can either be hardwired or on a remote device connected to Husky. Select-Before-Execute commands can also be executed from the Husky Studio.

Apart from configuration of local and extension racks, I/O modules and protocols, it integrates a powerful IEC 61131-3 ladder logic editor and simulator. Engineers can now write ladder logics and even test them without the RTU. With its powerful offline logic simulator, it allows engineers to run through the logic in offline mode. Values of different variables can be simulated in the simulator for exact real-time execution. This removes the dependency on the actual device thereby increasing the overall productivity of the engineer.

Some of the salient features of Husky Studio are –
o I/O module configuration including parameters like SoE, chattering, filtering, dead-band etc.
o Protocol configuration along with variable mapping.
o IEC61850 objects configuration and Object browser.
o Time synchronization.
o Upload / Download of RTU configuration.

o Real time monitoring of comm. status with subordinate devices.
o Fault Table View.
o Real-time monitoring of I/O variables with quality.
o Integrated Events viewer with millisecond resolution.
o Offline Logic Simulator for testing of logics without RTU.
o Online Logic Debugger.
o Import/Export of I/O configuration from MS Excel.
o Protocol data capture & viewing.
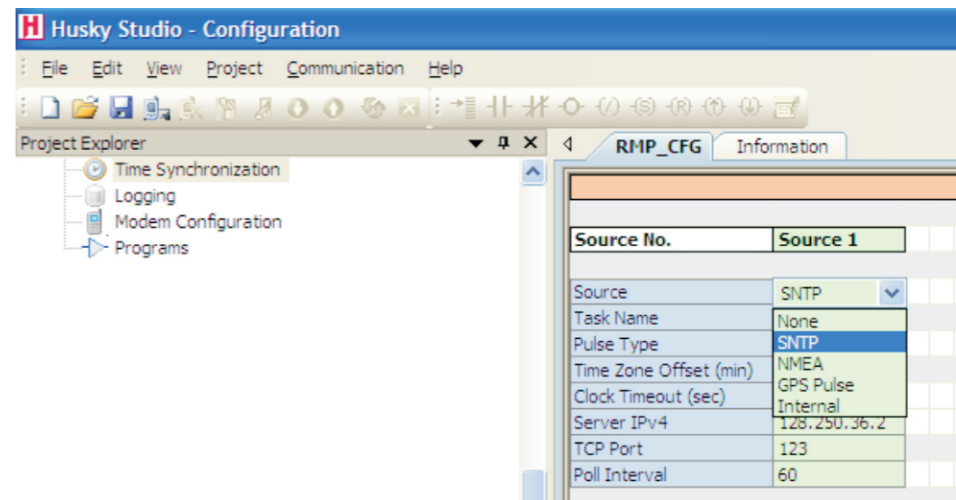
SECURITY FEATURES

With RTUs being installed in applications where access is over open, un-trusted, public networks, cyber security is an important requirement in an RTU. RTU 6049-E70 has a built-in firewall mechanism that allows only specified ports to be accessed by external clients. The RTU also supports SSL/TLS encrypted virtual private networks (VPN) which allow communication with remote devices over a secure channel. For server protocols, access control lists can be defined to restrict the clients that can access the server.

Audit logs are maintained by the RTU which log all connection requests, rejection, acceptance, etc. These logs can be accessed through HUSKY Studio or the web interface for monitoring of unauthorized access. This helps in owners achieving regulatory compliances like NERC/CIP, FERC, etc.

For pass-through connections supported by the RTU, specially designated virtual tags are maintained which indicate the status of disabled/enabled and granted connections.

PROGRAMMABILITY

Custom application logics can be programmed in the RTU using the IEC 61131 ladder logic. Standard functions and function blocks as per the IEC standard are built-in and additional user-defined functions and function blocks can be added.

HUSKY Studio provides the programming, debugging tools required for implementing these logics.

ENVIRONMENT FRIENDLY

All components selected for HUSKY RTUs are compliant to RoHS directive. RoHS directive is a single market directive on the restriction of certain hazardous substances. It seeks to reduce the environmental degradation by restricting the use of certain hazardous substances during the manufacturing of electrical and electronics products.

Integrated Ladder Logic Programming Editor/Debugger with simulation capabilities

Module-specific Input/Output Configuration

Live watch of variables with current state/quality and manual override facility

POWER SUPPLY UNIT
INPUT 24/48/110 DC
30W-60W
HIGH EFFICIENCY
FAIL SAFE, REDUNDANT
ISOLATED, REGULATED

19" SUB-RACK CHASSIS

DIGITAL OUTPUT
POTENTIAL FREE RELAY CONTACTS
PULSED, LATCHED OUTPUT
SELECT-BEFORE-EXECUTE (SBE)
1000V ISOLATION

DC ANALOG INPUT
+/-10VDC, 0-20mA INPUT
16 BIT RESOLUTION
0.1% ACCURACY
SELF CALIBRATING
2500V ISOLATION

DC ANALOG OUTPUT
+/-10VDC, 0-20mA,
4-20mA OUTPUT
16 BIT RESOLUTION
0.1% ACCURACY
2500V ISOLATION

AC ANALOG INPUT
4VT, 4CT INPUTS
CLASS 0.5
V, I, Hz, W, VA, VAr, PF
HARMONICS OPTIONAL
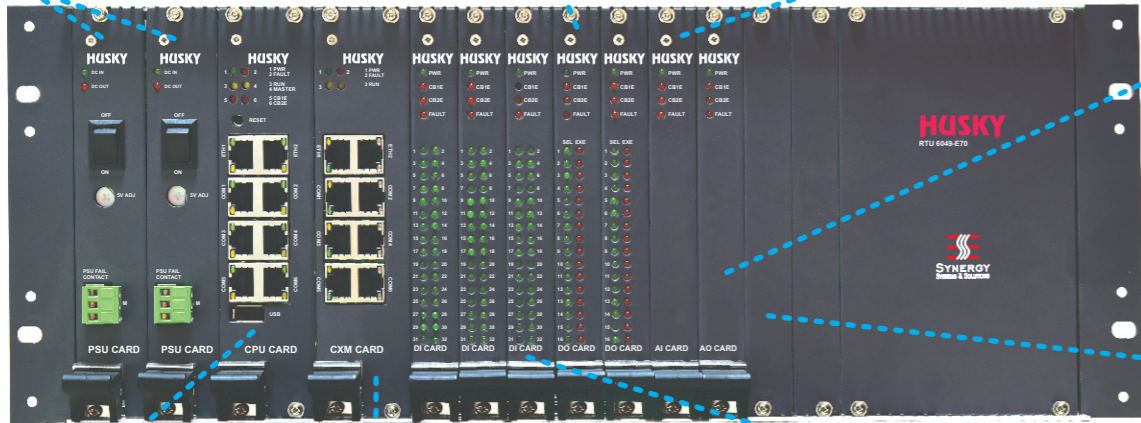
CPU E70
32-BIT PROCESSOR
MULTIPLE SERIAL PORTS
ON-BOARD DATA STORAGE
CPU REDUNDANCY
INDUSTRIAL GRADE

COMM. EXTENDER MODULE
ADDITIONAL COMMUNICATION PORTS FOR CPU
PROVIDES ETHERNET/SERIAL COMMS.
SUPPORTS ALL PROTOCOLS OF CPU
ISOLATED INTERFACES

DIGITAL INPUT
24VDC, 48VDC, 110VDC INPUTS
MULTIPLE GROUPS
1MS SEQUENCE-OF-EVENT RECORDING
3700V ISOLATION
GROUP-TO-GROUP ISOLATION

**PLUGGABLE PROCESS
I/O CONNECTIONS**

**EXPANSION BUS
CONNECTIONS**
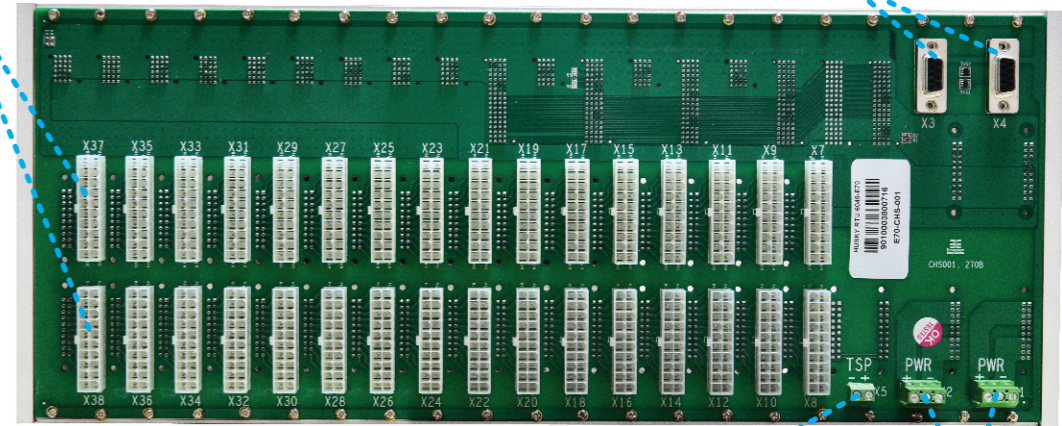
**1PPS/ 1PPM TIME
SYNC INPUT**

**DUAL REDUNDANT
POWER INPUTS**

NETWORK TOPOLOGY

MASTER CONTROL CENTRE NO.1   MASTER CONTROL CENTRE NO.2   MASTER CONTROL CENTRE NO.3   MASTER CONTROL CENTRE NO.4

TCP/SERIAL

ARCNet

OPTICAL TO COPPER CONVERTER

MAIN CPU

REDUNDANT CPU

LOCAL MAN MACHINE INTERFACE

ENGG. & DIAGNOSTIC TOOL

TO REDUNDANT CPU

MULTIPLE STD. TIME SOURCES

MODEM

WIRELESS MODEM

LOCAL IO RACK #1

REMOTE IO RACK

OFC

IED #1

IED #1

IED #n

IED #n

SLAVE RTU

IEC-61850

IEC-870-5, DNP3.0, MODBUS
ETH/RS232/RS485

LOCAL IO RACK #2

24

25

HUSKY mini

HUSKY RTU 6049-E70m from Synergy Systems and Solutions is a compact Remote Terminal Unit (RTU) to cater to the needs of remote data collection / automated monitoring/controlling systems, which typically have very low I/O counts. Built using the proven technology of RTU 6049-E70, the Mini-RTU offers a customized and cost-efficient solution for remote data collection applications. The Mini-RTU is an ideal choice for the applications that require interfacing with intelligent devices and with a limited number of hardwired I/O. The built-in wireless RF modem provides the RTU with RF communication capabilities. This allows use of public wireless infrastructure like GSM/GPRS/3G/CDMA to connect the RTU with central SCADA stations.

The RTU is equipped with RS232/RS485 ports, 10/100 Mbps Ethernet ports and an optional GPRS/3G/CDMA modem. The availability of protocols like IEC60870-5-101/103/104, MODBUS, IEC 61850 allows for integration with multi-vendor devices. The RF modem enables the RTU to be used in M2M applications. When used in conjunction with our M2M gateway, a full-featured remote telemetry/data collection solution can be implemented, that is both secure and scalable.

The RTU has built-in analog and digital I/O for interfacing with local hardwired signals. All the I/O channels are isolated and surge-protected, for use in electrically harsh environments. The digital inputs support 1ms Sequence of Events recording, and the digital outputs support Select-Before-Operate function. The analog input channels support DC voltage and current inputs.

The RTU supports SSL/TLS based encryption/decryption which enables a secure VPN. The Events/Alarms recorded by the RTU are stored in a battery-backed memory along with their time stamps and can be communicated to central station.

Mini-RTU supports programming of logics using IEC 61131-3 ladder logics. This allows for implementing local automation logics, like interlocks, operation sequences, etc. within the RTU. Multiple units of the Mini-RTU can be cascaded together to cater to additional I/O or communication requirements.

SPECIFICATIONS

Processor	Low Power, 400 MHz Processor
RAM	128 MB
Non-Volatile Memory	128 MB NAND Flash for configuration and program storage 512KB battery-backed RAM for Event storage
Serial	Up to 2 serial ports
	RS232 / RS485 software selectable
	Bit Rate <= 115200
	Surge protected
	Isolation = 3 KV
Ethernet	2x10/100 MBPS with Auto MDI-X Surge protected Isolation = 1KV
Local Bus	1 Mbps CAN Bus
Ethernet Interface	RJ 45
Serial Interface	RJ 45
RF Modem	GPRS / 3G / CDMA Radio Modem (Optional)
Power Consumption	20W Max. (@24VDC)
Operating Temp.	-5-70°C
Relative Humidity	95% Non-condensing
Dimensions	200mm x 150mm x 100mm
I/O Module Options (Other options available on request)	
E70m-IO-001	16x DI, 6x DO, 4x AI
E70m-IO-002	16x DI, 6x DO
E70m-IO-003	16x DI, 12x DO

Application Areas

- RMU/Recloser/Feeder RTU
- Automated Meter Reading
- Gas & Water Distribution
- Local Automation Unit
- Data Concentrator
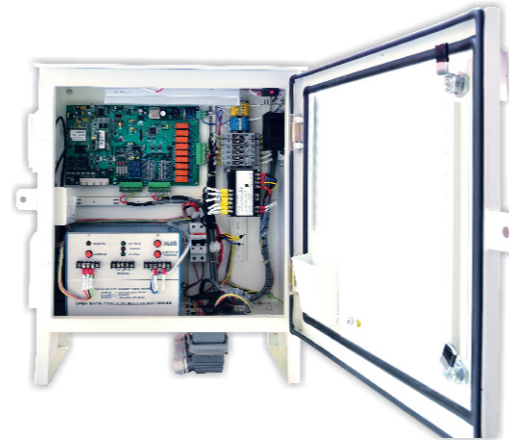
HUSKY Single-Board

HUSKY RTU 6049-E70sb is a high performance single board RTU powered by a fan-less 400 MHz processor. The RTU provides communication interfaces as well as I/O ports in a compact single board. The RTU is equipped with 2 nos. of Ethernet ports and 2 nos. of serial ports and DI, DO, AI options are available. Additionally, 2G/3G wireless interface is also supported as an option.

The core of the RTU is based on the HUSKY RTU 6049-E70 series. A System On Module (SOM), designed specifically for embedded systems is the brain of the RTU. The SOM comprises of a low power processor along with DDR RAM and NAND flash. A hardware watchdog monitors the CPU healthiness.

The RTU has option for wireless modem interface for communicating over radio networks. Different radio technologies can be used based on the chosen modem. Currently, GPRS, 3G, networks are supported. The RTU has in-built I/O suitable for applications with limited number of I/O or where space is a constraint. The I/O options are built into the same board as the processor. The processor communicates with the I/O interfaces over CAN Bus. A dedicated controller is provided to scan the I/O which operates independently of the main processor core. All I/O terminations are via pluggable terminal blocks. The digital output block provides isolated relay outputs suitable for driving loads up to 7A @ 24VDC.

SPECIFICATIONS

Processor	Low Power, 400 MHz Processor
RAM	128 MB
Non-Volatile Memory	128 MB NAND Flash for configuration and program storage 512KB battery-backed RAM for Event storage
Serial	Up to 2 serial ports (RJ45)
	RS232 / RS485 software selectable
	Bit Rate <= 115200
	Surge protected
	Isolation = 3 KV
Ethernet	Up to 2 ports (RJ45)
	10/100 MBPS with Auto MDI-X Surge protected Isolation = 1KV
RF Modem	GPRS / 3G / CDMA Radio Modem (Optional)
Power	15 W
Input Voltage	20-60 VDC
Isolation	1 KV galvanic isolation between Input & Output
Protection	Over voltage
	Under voltage
	Short Circuit
	Reverse Polarity
	EN 55022 Class B Filter
Operating Temp.	-5-70^{0}C
Relative Humidity	95% Non-condensing

Application Areas

- RMU/Recloser/Feeder RTU
- Distribution Transformer Monitoring
- Gas & Water Distribution

SYSTEM DESIGN CAPACITY

Maximum Wired Tags	Digital Inputs : 4096 Digital Outputs : 2048 Analog Inputs : 1024 Analog Outputs : 512 Counters : 512
Maximum Virtual Tags	Boolean : 8192 16-bit Integer : 16384 32-bit Integer : 10240 32-bit Float : 10240 Timers : 128
Maximum CXM Modules	4
Maximum I/O Racks	8
Maximum Devices	32 devices per serial port 256 devices maximum
Maximum Communication Tasks	64

GENERAL OPERATING PARAMETERS

Nominal Input Voltage	24/48/110VDC
Relative Humidity	95%
Operating Temperature (°C)	-5 – 70

SUPPORTED PROTOCOLS

Slave/Server Protocols	IEC 870-5-101 IEC 870-5-104 DNP 3.0 Serial DNP 3.0 LAN/WAN Modbus RTU serial Modbus RTU TCP IEC 61850-8-1 SPORT Proteus 2000 EQUINODE
Master/Client Protocols	IEC 870-5-101 IEC 870-5-103 IEC 870-5-104 DNP 3.0 Serial DNP 3.0 LAN/WAN Modbus RTU serial Modbus RTU TCP IEC 61850-8-1 RP570 SPA Bus LON Bus SEL ASCII DLMS COSEM

SPECIFICATIONS — E70-CPU-00x

Processor	Low-power 400MHz fan-less processor
Main Memory	128MB RAM
Non-volatile memory	128MB NAND Flash 512kB battery-backed RAM
Real-time Clock	Battery-backed RTC with 1ppm accuracy
Ethernet Ports	10/100Mbps with Auto MDI-X Isolation up to 1kV
Serial Ports	RS232/RS485 Selectable Full-modem signals available on select ports Isolation up to 3kV, Surge protected channels Baud rates up to 115.2Kbps
USB Port	1 USB port for field upgrade of CPU firmware
Local I/O Bus	CAN Bus @ 1Mbps
Expansion I/O Bus	ARCNet @ 10Mbps max
Parallel Bus	16-bit parallel bus for peripheral expansion
Input Voltage	+5VDC sourced from the backplane
Backplane Power consumption	10W
Module Indications	• PWR – Indicates presence of power to the module • RUN – Indicates functioning of the module • CB1E, CB2E – Indicates presence of error on the I/O bus • FAULT – Indicates presence of some faults recorded • MSTR – Indicates operation in master mode
I/O Connections	RJ45 connectors for serial/Ethernet ports
Operating Temperature (°C)	-5 – 70
Relative Humidity	95%
Dimensions	4U high x 8T wide. Occupies 2 slot widths

ORDER CODE	SPECIFICATIONS
E70-CPU-001	6x RS232/RS485 Ports 2x 10/100Mbps Ethernet Ports
E70-CPU-002	4x RS232/RS485 Ports 2x 10/100Mbps Ethernet Ports
E70-CPU-003	2x RS232/RS485 Ports 2x 10/100Mbps Ethernet Ports

SOFTWARE OPTIONS

E70-SW-LDL	IEC 61131-3 Ladder Logic Support
E70-SW-101M	IEC 870-5-101 Master Protocol
E70-SW-101S	IEC 870-5-101 Slave Protocol
E70-SW-104M	IEC 870-5-104 Client Protocol
E70-SW-104S	IEC 870-5-104 Server Protocol
E70-SW-103M	IEC 870-5-103 Master Protocol
E70-SW-DNP3M	DNP 3.0 Master/Client Protocol
E70-SW-DNP3S	DNP 3.0 Slave/Server Protocol
E70-SW-SPAM	SPA Bus Master Protocol
E70-SW-61850C	IEC 61850-8-1 Client Protocol

SPECIFICATIONS — E70-CXM-00x

SPECIFICATIONS	E70-CXM-00x
Ethernet Ports	10/100Mbps with Auto MDI-X Isolation up to 1kV
Serial Ports	RS232/RS485 Selectable Full-modem signals available on select ports Isolation up to 3kV, Surge protected channels Baud rates up to 115.2Kbps
Input Voltage	+5VDC sourced from the backplane
Backplane Power consumption	5W max
Module Indications	• PWR – Indicates presence of power to the module • RUN – Indicates functioning of the module
I/O Connections	RJ45 connectors for serial/Ethernet ports
Operating Temperature (°C)	-5 – 70
Relative Humidity	95%
Dimensions	4U high x 8T wide. Occupies 2 slot widths

ORDER CODE	SPECIFICATIONS
E70-CXM-001	6x RS232/RS485 Ports 2x 10/100Mbps Ethernet Ports
E70-CXM-002	4x RS232/RS485 Ports 2x 10/100Mbps Ethernet Ports
E70-CXM-003	2x RS232/RS485 Ports 2x 10/100Mbps Ethernet Ports
E70-CXM-004	6x RS232/RS485 Ports 1x 10/100Mbps Ethernet Ports
E70-CXM-005	4x RS232/RS485 Ports 1x 10/100Mbps Ethernet Ports
E70-CXM-006	2x RS232/RS485 Ports 2x Fiber Optic Ethernet Ports

SPECIFICATIONS — E70-IOS-00x

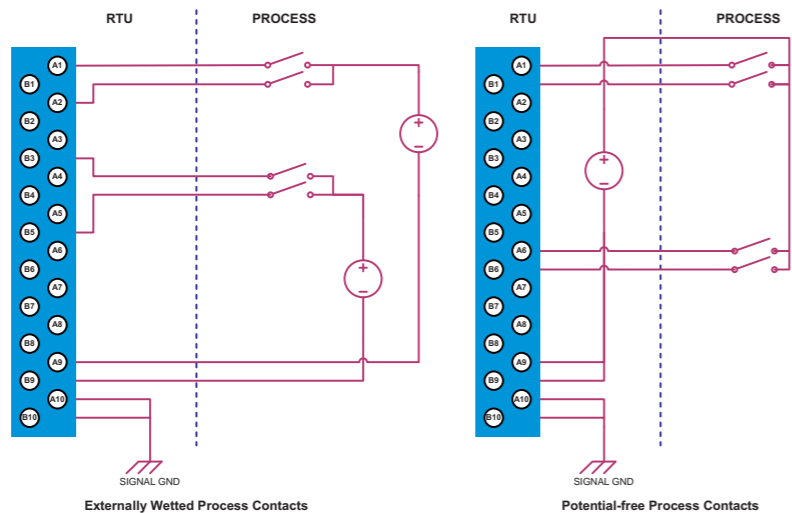| SPECIFICATIONS	E70-IOS-00x
Input Voltage	+5VDC sourced from the backplane
Backplane Power consumption	3W max
Module Indications	• PWR – Indicates presence of power to the module • RUN – Indicates functioning of the module • CB1E, CB2E – Indicates presence of error on the local I/O bus • FAULT – Indicates presence of some faults recorded
Operating Temperature (°C)	-5 – 70
Relative Humidity	95%
Dimensions	4U high x 4T wide

ORDERING INFORMATION

ORDER CODE	SPECIFICATIONS
E70-IOS-001	Expansion Rack I/O Scanner for Copper Media
E70-IOS-002	Expansion Rack I/O Scanner for Fiber Optic Media

I/O SCANNER WITH FO

SPECIFICATIONS — E70-DIA-00x / E70-DIB-00x

SPECIFICATIONS	E70-DIA-00x		E70-DIB-00x
General	Onboard 32-bit microcontroller		
Sequence of Events (SoE)	Module-level time stamps at 1msec resolution		
I/O Configuration	32 channels 4 groups of 8 Pos Logic		16 channels Individual return Pos/Neg Logic Optional Look Check Functionality
Nominal Input Voltage	110 VDC	48 VDC	24 VDC
ON Input Range	80-120 VDC	38-50 VDC	15-30 VDC
OFF Input Range	0-56 VDC	0-24 VDC	0-12 VDC
Input Current per channel	‹ 3mA	‹ 2 mA	‹ 1 mA
Input Filter Time (ms)	10ms (default). Settable from RTU configuration software (0-250 ms)		
Anti-chatter Function	Yes		
Isolation between field & system	3.7kVDC		
Isolation between groups	500VDC		
Input Protection	Surge and overload protection		
Pulse Counter	32-bit. Maximum of eight channels		
Pulse Counter Frequency	1kHz maximum (Form A/B)		
Input Voltage	+5VDC sourced from the backplane		
Backplane power consumption	2.5W max		
Module Indications	• PWR – Indicates presence of power to the module • CB1E, CB2E – Indicates presence of error on the I/O bus • FAULT – Indicates presence of some fault on the module • CH STATUS – Status indication for each channel is provided. A lit green LED indicates that the channel is in ON condition.		
I/O Connections	2x20-pin Pluggable connector on chassis backplane		
Operating Temperature (°C)	-5 – 70		
Relative Humidity	95%		
Dimensions	4U high x 4T wide. Occupies 1 slot width		

RTU   PROCESS   RTU   PROCESS

Externally Wetted Process Contacts   **Potential-free Process Contacts**

SIGNAL GND   SIGNAL GND

ORDERING INFORMATION

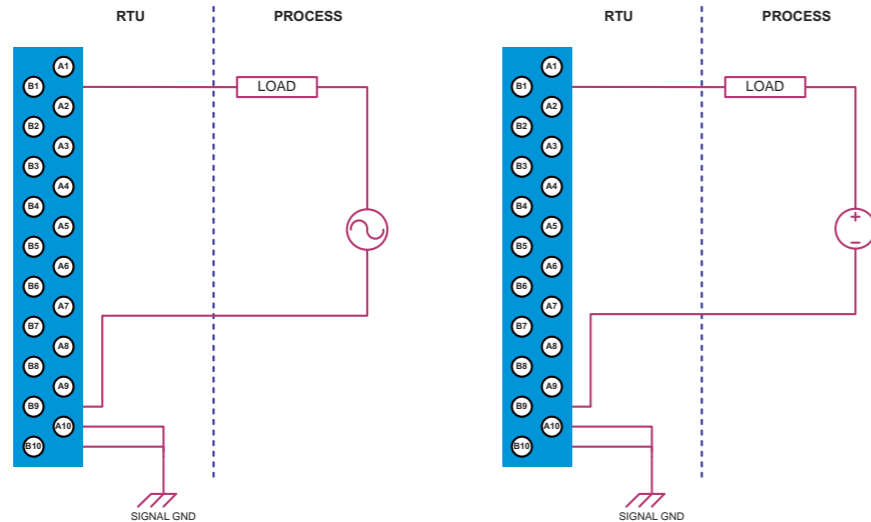| ORDER CODE	SPECIFICATIONS
E70-DIA-001	32 channels, Positive Logic, 110VDC Input
E70-DIA-002	32 channels, Positive Logic, 48VDC Input
E70-DIA-003	32 channels, Positive Logic, 24VDC Input
E70-DIB-001	16 channels, Positive/Negative Logic, 110VDC Input
E70-DIB-002	16 channels, Positive/Negative Logic, 48VDC Input
E70-DIB-003	16 channels, Positive/Negative Logic, 24VDC Input
E70-DIB-006	16 channels, Loop Check Function, 24VDC Input

SPECIFICATIONS	E70-DOA-00x
General	Onboard 32-bit microcontroller
I/O Configuration	Potential free Normally Open Contacts
Output Type	Latched, Pulsed, Select-before-Execute modes. Configurable on module basis
Contact Rating	24/48VDC @ 0.5A 230VAC @ 1A
Isolation between field & system	1kV
Input Voltage	+5VDC sourced from the backplane
Backplane power consumption	2.5W max
Module Indications	• PWR – Indicates presence of power to the module • CB1E, CB2E – Indicates presence of error on the I/O bus • FAULT – Indicates presence of some fault on the module • CH STATUS – Status indication for each channel's SELECT (green) and EXECUTE (red) is provided.
I/O Connections	2x20-pin Pluggable connector on chassis backplane
Operating Temperature (°C)	-5 – 70
Relative Humidity	95%
Dimensions	4U high x 4T wide. Occupies 1 slot width

RTU | PROCESS

LOAD

SIGNAL GND

RTU | PROCESS

LOAD

SIGNAL GND

ORDERING INFORMATION

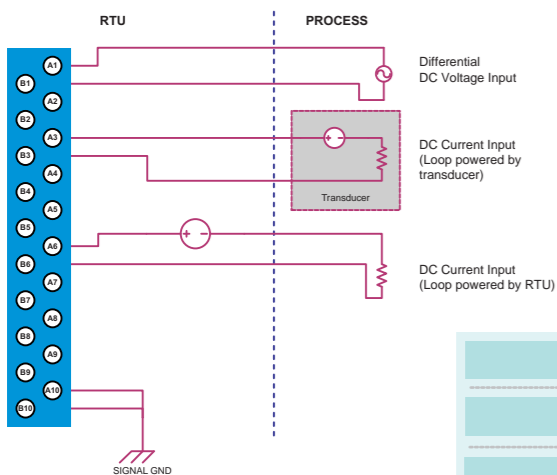| ORDER CODE	SPECIFICATIONS
E70-DOA-001	16 channels, Potential Free NO contacts
E70-DOA-002	8 channels, Potential Free NO contacts

SPECIFICATIONS	E70-AIB-00x
General	Onboard 32-bit microcontroller
I/O Configuration	Differential multiplexed channels. Each channel can be individually selected for voltage/current input.
Voltage Inputs	• 0-10V DC • 0-5V DC • +/- 10V DC • +/- 5V DC Uninstall the channel jumper to enable voltage mode.
Current Inputs	• 0-20mA • 4-20mA • +/-20mA Install the channel jumper to enable current mode.
Input Impedance	Voltage Inputs: 1 MOhm nominal Current Inputs: 250 Ohm nominal
Calibration	On-board temperature sensor for self calibration at different temperatures. Lab calibration feature supported.
Over-range/Under-range Detection	Yes
Input Resolution	16-bit. 15 data bits + 1 sign bit
Accuracy	0.1% FS
Channel Update Rate	• 130 msec with 50/60Hz rejection enabled • 40 msec without any filter enabled
Counts	• 0-10V DC: 0 – 32767 • 0-5V DC: 0 – 32767 • +/- 10V DC: ±32767 • +/- 5V DC: ±32767 • 0-20mA: 0 – 32767 • 4-20mA: 0 – 32767 • +/-20mA: ±32767
Isolation between field and system	2.5kV
Input Voltage	+5VDC sourced from the backplane

SPECIFICATIONS — E70-AIB-00x

Overload Capability	With stands upto 150% of full scale range.
Backplane power consumption	2.5W max
Module Indications	• PWR – Indicates presence of power to the module • CB1E, CB2E – Indicates presence of error on the I/O bus • FAULT – Indicates presence of some fault on the module
I/O Connections	2x20-pin Pluggable connector on chassis backplane
Operating Temperature (°C)	-5 – 70
Relative Humidity	95%
Dimensions	4U high x 4T wide. Occupies 1 slot width

RTU   PROCESS

Differential DC Voltage Input

DC Current Input (Loop powered by transducer)

Transducer

DC Current Input (Loop powered by RTU)

SIGNAL GND

ORDERING INFORMATION

ORDER CODE	SPECIFICATIONS
E70-AIB-001	12 Voltage/Current differential input channels
E70-AIB-002	16 Voltage/Current differential input channels
E70-AIB-003	8 Voltage/Current differential input channels

SPECIFICATIONS — E70-AOA-001
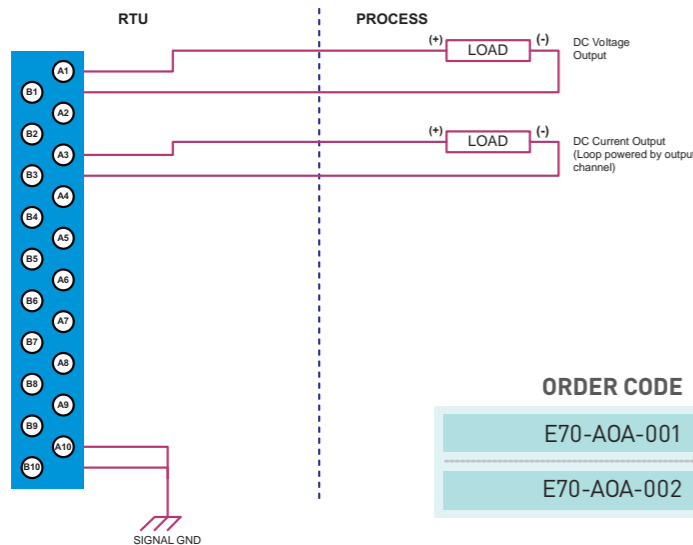
General	Onboard 32-bit microcontroller
I/O Configuration	Individually isolated output channels
Output Types	Each channel can be individually selected for voltage/current output
Voltage Outputs	• 0-10V DC • 0-5V DC • +/- 10V DC • +/- 5V DC Install the channel jumper in 2-3 position for voltage mode.
Current Outputs	• 0-20mA • +/- 20mA (Optional) • 4-20mA Install the channel jumper in 1-2 position for current mode.
Output Resolution	16-bit. 15 data bits + 1 sign bit
Output Accuracy	0.1% FS
Output Load Characteristics	• Voltage Outputs : > 1 kOhm • Current Outputs : < 1 kOhm
Output Channel Update Rate	< 10 msec
Output Counts	• 0-10V DC: 0 – 32767 • 0-5V DC: 0 – 32767 • +/- 10V DC: ±32767 • +/- 5V DC: ±32767 • 0-20mA: 0 – 32767 • 4-20mA: 0 – 32767
Isolation between field & system	2.5kV
Input Voltage	+5VDC sourced from the backplane. For analog outputs, external +24VDC must be connected via the process I/O connector
Power Consumption	Backplane - 1.5W max +24VDC Power Supply – 8.5W max

SPECIFICATIONS E70-AOA-001

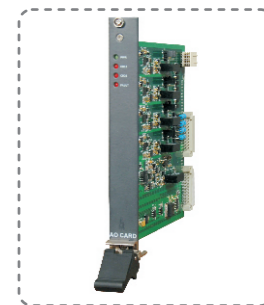|	
Module Indications	• PWR – Indicates presence of power to the module • CB1E, CB2E – Indicates presence of error on the I/O bus • FAULT – Indicates presence of some fault on the module
I/O Connections	2x20-pin Pluggable connector on chassis backplane
Operating Temperature (°C)	-5 – 70
Relative Humidity	95%
Dimensions	4U high x 4T wide. Occupies 1 slot width

ORDERING INFORMATION

ORDER CODE	SPECIFICATIONS
E70-AOA-001	4 Voltage/Current output channels
E70-AOA-002	8 Voltage/Current output channels

SPECIFICATIONS E70-AXA-001

|	
General	Onboard 32-bit microcontroller
I/O Configuration	4 differential multiplexed input channels 4 individually isolated output channels
Input Types	Each channel can be individually selected for voltage/current input
Output Types	Each channel can be individually selected for voltage/current output
Voltage Inputs	• 0-10V DC • 0-5V DC • +/- 10V DC • +/- 5V DC Uninstall the channel jumper to enable voltage mode.
Current Inputs	• 0-20mA • 4-20mA • +/-20mA Install the channel jumper to enable current mode.
Input Impedance	Voltage Inputs: 240 kOhm nominal Current Inputs: 250 Ohm nominal
Input Resolution	16-bit. 15 data bits + 1 sign bit
Input Channel Update Rate	• 130 msec with 50/60Hz rejection enabled • 40 msec without any filter enabled
Over-range/Under-range Detection	Yes
Voltage Outputs	• 0-10V DC • 0-5V DC • +/- 10V DC • +/- 5V DC Install the channel jumper in 2-3 position for voltage mode.
Current Outputs	• 0-20mA • +/- 20mA (Optional) • 4-20mA Install the channel jumper in 1-2 position for current mode.

SPECIFICATIONS — E70-AXA-001

Output Resolution	16-bit. 15 data bits + 1 sign bit
Output Accuracy	0.1% FS
Output Load Characteristics	• Voltage Outputs : > 1 kOhm • Current Outputs : < 1 kOhm
Output Channel Update Rate	< 10 msec
Output Counts	• 0-10V DC: 0 – 32767 • 0-20mA: 0 – 32767 • 0-5V DC: 0 – 32767 • 4-20mA: 0 – 32767 • +/- 10V DC: ±32767 • +/- 5V DC: ±32767
Isolation between field & system	2.5kV
Input Voltage	+5VDC sourced from the backplane. For analog outputs, external +24VDC must be connected via the process I/O connector
Power Consumption	Backplane - 2.5W max +24VDC Power Supply – 8.5W max
Module Indications	• PWR – Indicates presence of power to the module • CB1E, CB2E – Indicates presence of error on the I/O bus • FAULT – Indicates presence of some fault on the module
I/O Connections	2x20-pin Pluggable connector on chassis backplane
Operating Temperature (°C)	-5 – 70
Relative Humidity	95%
Dimensions	4U high x 8T wide. Occupies 2 slot widths

ORDERING INFORMATION

ORDER CODE	SPECIFICATIONS
E70-AXA-001	4 Voltage/Current differential input channels 4 Voltage/Current output channels

SPECIFICATIONS

	E70-PSU-001	E70-PSU-002	E70-PSU-003
Input Voltage	18-60VDC		90-150VDC
Output Voltage	+5VDC		+5VDC/10A, +48VDC/0.5A
Power	60W	30W	50W
Output Voltage Adjustment	±10% through POT		±5% through POT
Line/Load Regulation	Line/Load Regulation: ±5mV/±5mv		
Isolation	1kVAC for 1min.		
Protection	Over current, over voltage protection		
Noise Filter	EN55022 Class B Filter for noise suppression		
Operating Temperature (°C)	-5 – 70		
Relative Humidity	95%		

Add -R suffix for redundancy option.
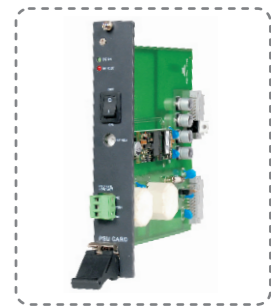
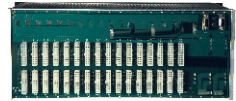| SPECIFICATIONS	E70-CHS-00x
I/O Connections	3-pin terminal block for power supply input 2x20-pin Pluggable connectors for I/O modules
Operating Temperature (°C)	-5 – 70
Relative Humidity	95%

ORDERING INFORMATION

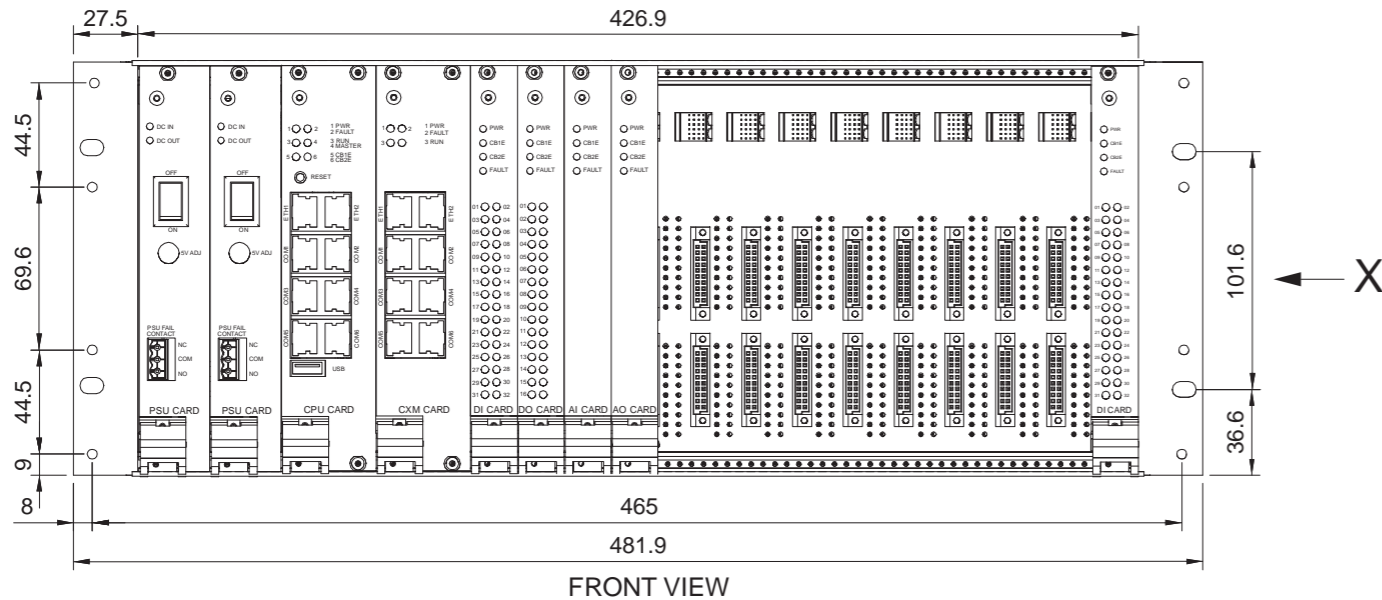| ORDER CODE	SPECIFICATIONS
E70-CHS-001	2x PSU Slots 1x CPU Slot 5x I/O Slots (2x slots can be used for CXM modules)
E70-CHS-002	2x PSU Slots 1x CPU Slot 16x I/O Slots (4x slots can be used for CXM modules)
E70-CHS-005	2x PSU Slots 2x CPU Slots 15x I/O Slots (14 in case of dual CPU)

ORDERING INFORMATION

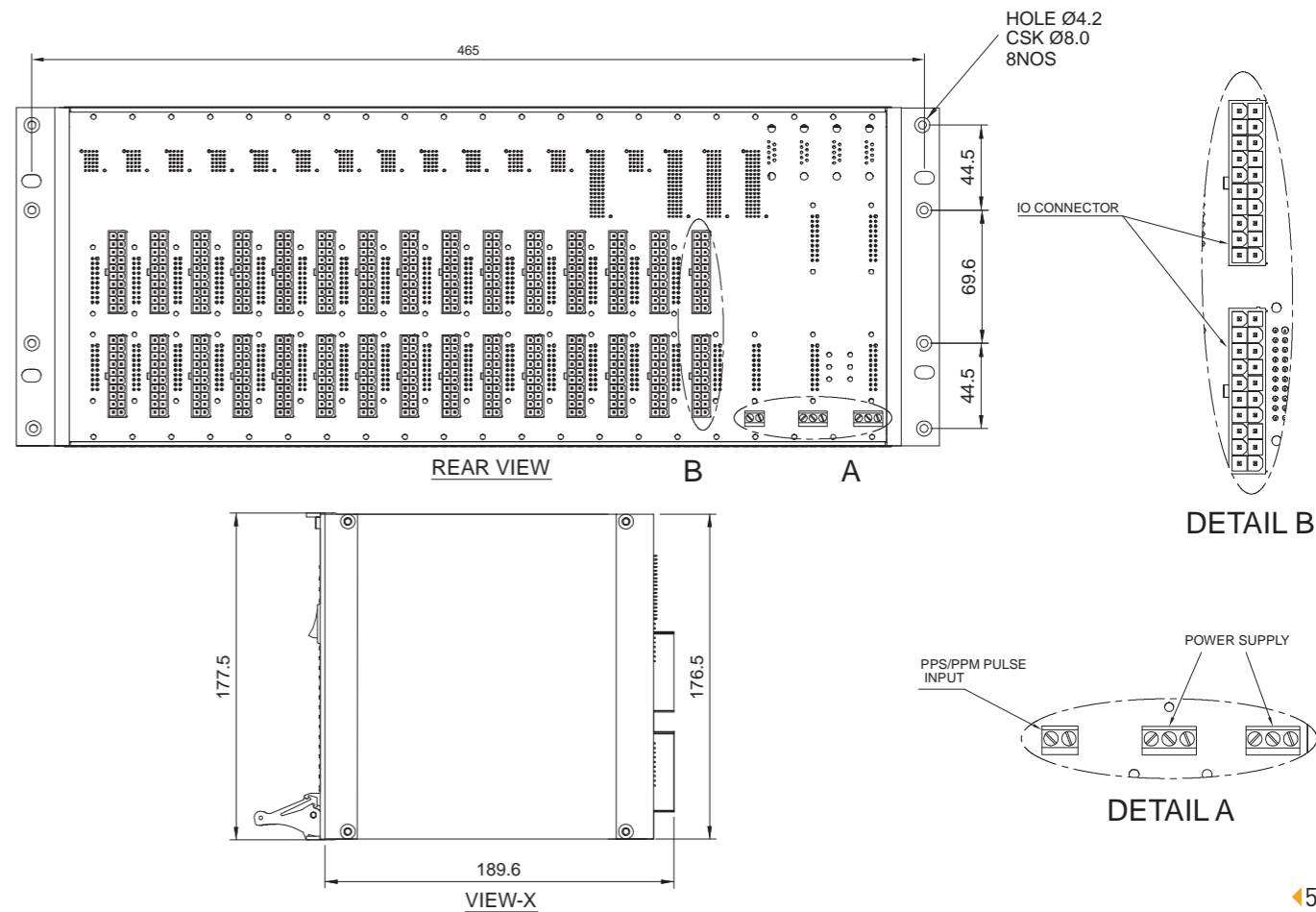| ORDER CODE	SPECIFICATIONS
E70-MDM-001	Leased-Line Low Speed 4-wire FSK Modem
E70-MDM-002	Dial-up / Leased-Line 33.6kbps 2-wire / 4-wire Modem
E70-ESW-00x	• 4x 10/100 Copper Ports • 4x 10/100 Copper Ports + 2x 100BaseFX MM Ports (2km) • 4x 10/100 Copper Ports + 2x 100BaseFX SM Ports (20km)
E70-RF-00x	• GPRS Modem • 3G Modem • CDMA Modem
E70-LNA-001	LONWORKS® Network Interface Adapter (Supports ABB LON Devices)

TEST	SPECIFICATIONS	
ENVIRONMENTAL		
Dry Heat Test	70°C for 96 hours	IEC 60068-2-2
Damp Heat Test	40°C, 95%RH for 12 hours	IEC 60068-2-78
Cold Test	-5°C (minus 5 deg.C) for 16 hours	IEC 60068-2-1
Temperature Cycling Test	-5°C to 50°C to 0°C @ 1°C /min for 5 cycles	IEC 60068-2-14
Vibration Test	10-150Hz with displacement of 0.15mm Acceleration of 2g for 2hrs on each axis	IEC 60068-2-6
EMI/EMC		
Electrostatic Discharge Test	Amplitude: ±8kV (Air)±6kV (Contact) Mode: Indirect and Direct Severity level: 3	IEC 61000-4-2
Electric Fast Transient Test (Burst Test)	Amplitude: ±4kV (for DC lines) and ±2kV (for signal lines) Pulse: 5/50ns Severity level: 4	IEC 61000-4-4
Power Frequency Magnetic Immunity test	30A/m for 1minute and 300A/m for 1 to 3 seconds Severity Level: 4	IEC 61000-4-8
Conducted Immunity Test	150kHz to 80MHz, 80% AM Severity Level: 3	IEC 61000-4-6
Damped Oscillatory Magnetic Immunity Test	30A/m @ 1MHz Severity Level: 4	IEC 61000-4-10
Damped Oscillatory Wave Test	Amplitude: ±1kV (differential) and ±2.5kV (common mode) Damped oscillation of 1MHz for 2 seconds Severity Level: 3	IEC 61000-4-12

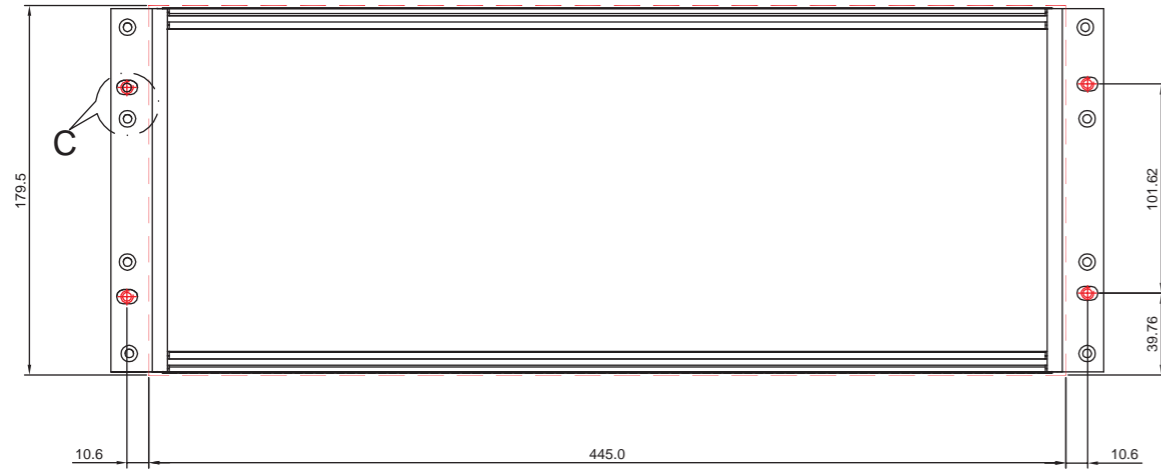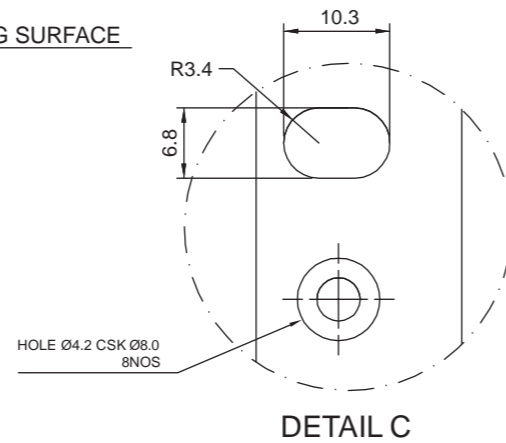| TEST	SPECIFICATIONS	
EMI/EMC		
Ripple Test on DC Power Supply	5% of input DC power @ 100Hz, 150Hz, ..., 300Hz Severity Level: 2	IEC 61000-4-17
Radiated Immunity Test (Radiated RFI Test)	Frequency: 80-1000MHz Voltage: 10V/m Severity Level: 3	IEC 61000-4-3
Voltage Ranges & Tolerances Test	±15% of nominal input voltage	IEC 60870-2-1
Conducted Emission Test		CISPR 22 Class A
Radiated Emission Test		CISPR 22 Class A
Voltage Interruption Test	Interruption of 10ms duration	IEC 61850-3/2002
Surge Test	Pulse: 1.2/50uS Amplitude: ±2kV (Symmetrical) ±4kV (Asymmetrical) Severity Level: 4	IEC 61000-4-5
Mains Frequency Voltage Test	30V continuous, 5 minutes 300V, 1 second Severity Level: 4	IEC 61000-4-16
High Voltage Impulse Test	Pulse: 1.2/50uS	IEC 60255-5
Strength Test	2kV rms	IEC 60255-5
Megger Test	500VDC, Impedance > 250MOhm	IEC 60255-5

MOUNTING ARRANGEMENT

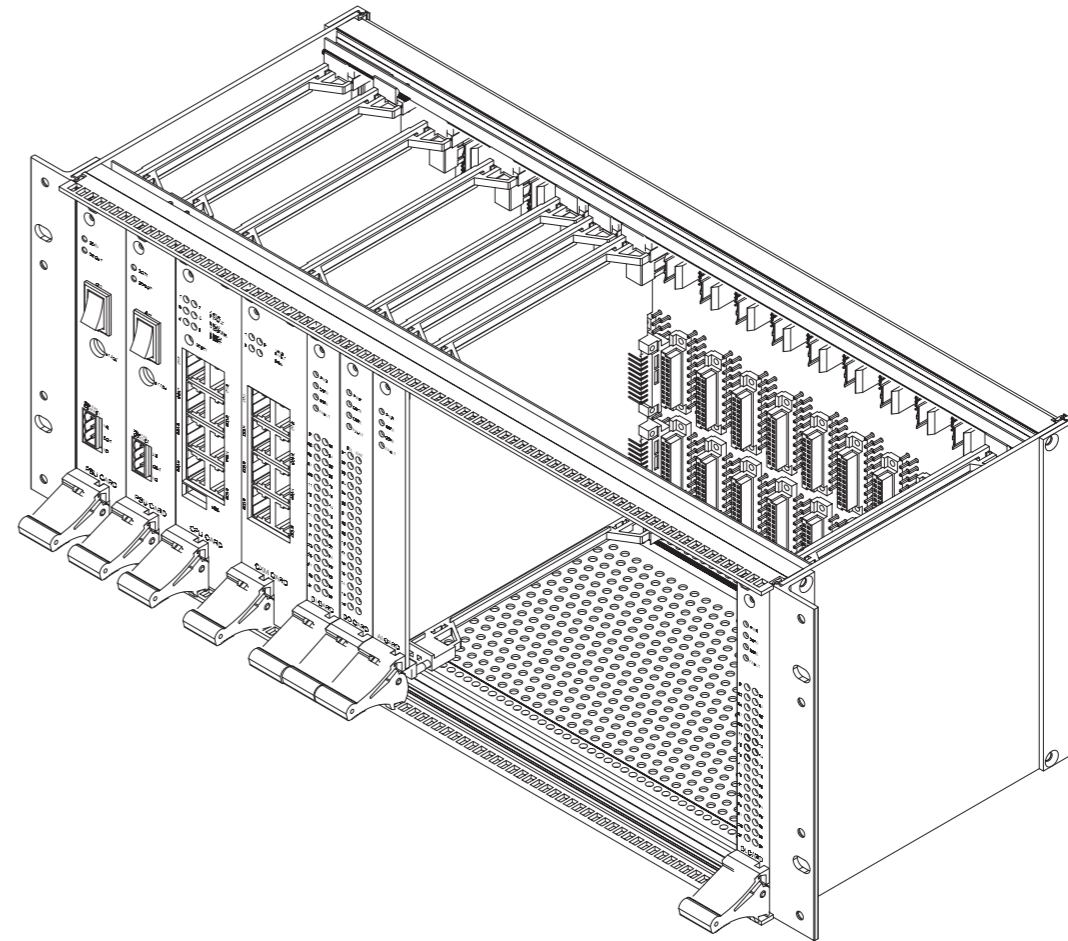
FRONT VIEW

MOUNTING ARRANGEMENT

REAR VIEW

B   A

DETAIL B

VIEW-X

DETAIL A

IO CONNECTOR

POWER SUPPLY

PPS/PPM PULSE INPUT

HOLE Ø4.2
CSK Ø8.0
8NOS

PANEL CUTOUT DETAILS

179.5

101.62

39.76

C

10.6   445.0   10.6

FOR RACK CUTOUT SIZE ON MOUNTING SURFACE

10.3

R3.4

6.8

HOLE Ø4.2 CSK Ø8.0
8NOS

DETAIL C

ISOMETRIC VIEW

Applications

Customer Approvals

- ❍ Indian Railways
- ❍ Transco - PGCIL, UPPTCL, UJVNL, MSETCL, GETCO
- ❍ Distco - Tata Power - Delhi, BSES Delhi, Noida Power, Torrent Power, MSEDCL, CSPDCL, UPCL
- ❍ PSUs - GAIL, BHEL, IGL, IRCON, MMRDA

COMPANY PROFILE

SYNERGY SYSTEMS & SOLUTIONS, ESTABLISHED IN 1994, HAS COME A LONG WAY TO BECOME ONE OF THE LEADING SOLUTION PROVIDERS IN THE CONTROL SYSTEMS DOMAIN IN INDIA. WITH MORE THAN 20 YEARS OF EXPERIENCE, IT PROVIDES TURNKEY SOLUTIONS TO THE AUTOMATION NEEDS OF ITS CUSTOMERS.

Right at the onset, Synergy Systems & Solutions, developed state-of-the-art Supervisory Control and Data Acquisition (SCADA) software- SIRIUS™. Since its introduction into automation market in the year 2000, SIRIUS has been deployed at numerous prestigious projects in Power, Railway, Oil & Gas sectors.

Another landmark development by Synergy Systems & Solutions, is a state-of-the-art, world class, intelligent RTU-HUSKY™, which complements its range to offer total in-house solutions to its customers.

Synergy Systems & Solutions, with its core team, has an edge to offer competitive solutions which not only include the supply, commissioning, maintenance of complete control systems, but also providing customized solution and integration services.

SYNERGY SYSTEMS & SOLUTIONS AIMS TO BECOME THE LEADER IN CONTROL SYSTEMS IN INDIA.

HUSKY
RTU6049-E70 mini

SEL
EXE
DO

DI

FLT U1 RF1
PWR RUN U0 RF0   RESET

ETH1 ETH2 COM1 COM2   ANT

6049-E70