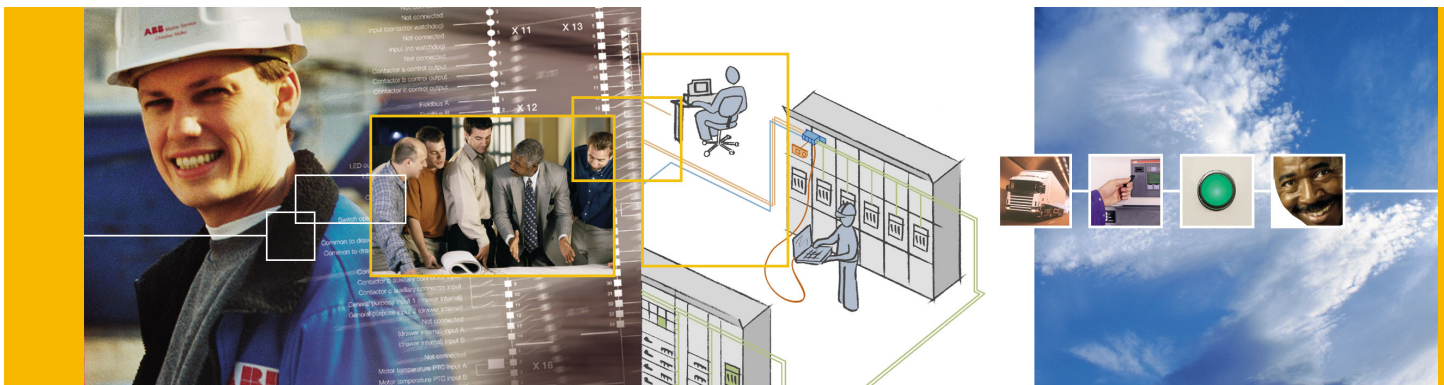# Protect^{IT} – MNS Motor Management INSUM®

Dual Redundancy Guide
Version 2.3

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INSUM®
Dual Redundancy Guide

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Dual Redundancy Guide

Notes:

1   General

1.1   Objective

The objective of the document is to advise on the interpretation of dual redundancy in INSUM and the most recommended dual redundant configuration.

1.2   Application advice

Refers to all types of Gateways in dual redundant INSUM configuration, INSUM Router hardware rev.3.0

1.3   Related Documentation

1TGC 901007 B0201 INSUM Technical Information
1TGC 901021 M0201 INSUM MCU Users Guide
1TGC 901026 M0201 INSUM MCU Parameter Description
1TGC 901034 M0201 INSUM MMI Operating Instruction
1TGC 901030 M0201 INSUM MMI Quick Guide
1TGC 901042 M0201 INSUM Modbus Gateway Manual
1TGC 901052 M0201 INSUM Profibus Gateway Manual
1TGC 901060 M0201 INSUM Ethernet Gateway Manual
1TGC 901080 M0201 INSUM System Clock Manual
1TGC 901090 M0201 INSUM Control Access Guide
1TGC 901091 M0201 INSUM Failsafe Guide
1TGC 901093 M0201 INSUM Network Management Guide
SACE RH 0080 Rev.l PR112/ PD-L LON Works Interface V2.0
1SEP 407948 P0001 Users Manual Intelligent Tier Switch (ITS)

Notes:

2   INSUM Philosophy of Dual Redundancy

2.1   Background

INSUM provides the communication interface to the plant process control system (PCS/DCS) or any other external supervisory system by means of Gateways. Existing Gateways types support MODBUS, PROFIBUS-DP and Ethernet communication protocol.

If a higher availability (dual redundancy) is required, two alternatives are provided by INSUM to support such requirements.

2.2   Dual Redundancy Interpretation

The data provided from INSUM to the process control system shall be available dual redundant (two communication links to the PCS/DCS). INSUM supports two parallel communication lines to the PCS and provides the same data continuously at all times on both lines.

The following alternatives are available:

- Dual <u>Gateway</u> Configuration
- Dual <u>Backplane</u> Configuration

One Gateway/backplane shall be selected active for control from the PCS, the second Gateway/backplane constantly exchanges a 'handshake' initiated by the PCS controller to ensure an active communications link. In the event of loss of communication on the active link or loss of component, the PCS has to initiate the switch-over and maintain control and monitoring through the second Gateway/backplane.

Note:
 In both of the alternatives, the dual bus redundancy ends at the Gateway level. The redundancy is not further extended down to the MCU level. On no account the INSUM dual redundancy should be expected below the Gateway level. Although the ring network structure is possible for MCU subnets but should not be misinterpreted as a support to achieve the MCU redundancy.

2.2.1   Dual Gateway Configuration

INSUM supports the dual bus redundancy of the communication interface by duplicating the Gateways. Both Gateways are residing on the same backplane. The Gateways are constantly updated by each field device. The handling of redundancy must then be performed by the external system (PCS/DCS).

INSUM allows the communication at all times on both lines but whereas switching over, failure detection and other functions needed for adequate handling of dual redundancy are not the scope of INSUM.

2.2.2   Dual Backplane Configuration

The INSUM availability can be increased further by using two backplanes. In this configuration, the Gateways are mounted on separate backplanes. The handling of dual redundancy must still be performed by the external system (PCS/DCS). To ensure maximised system security and availablility each backplane shall be individually supplied from a secure voltage source. Further, the serial links from the Gateways to the PCS should be routed via alternate paths in the plant. The system architecture allows each Gateway to be constantly updated by each field device.

INSUM allows the communication at all times on both lines but whereas switching over, failure detection and other functions needed for adequate handling of dual redundancy are not the scope of INSUM.

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Notes:

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3 Schematics

3.1 Dual Gateway Configuration

Abbreviations
LON   Local Operating Network
MMI   Man Machine Interface
MCU   Motor Control Unit

INSUM® OS

Ethernet TCP/IP

No redundancy below this part, except gateways

Plant Control System

Redundant communication lines

INSUM® MMI

LON Bus @ 78kBaud

Up to four LON links with up to 32 devices per link, total 128 devices (depends on gateway type used).

Picture 1. Dual Gateway Configuration

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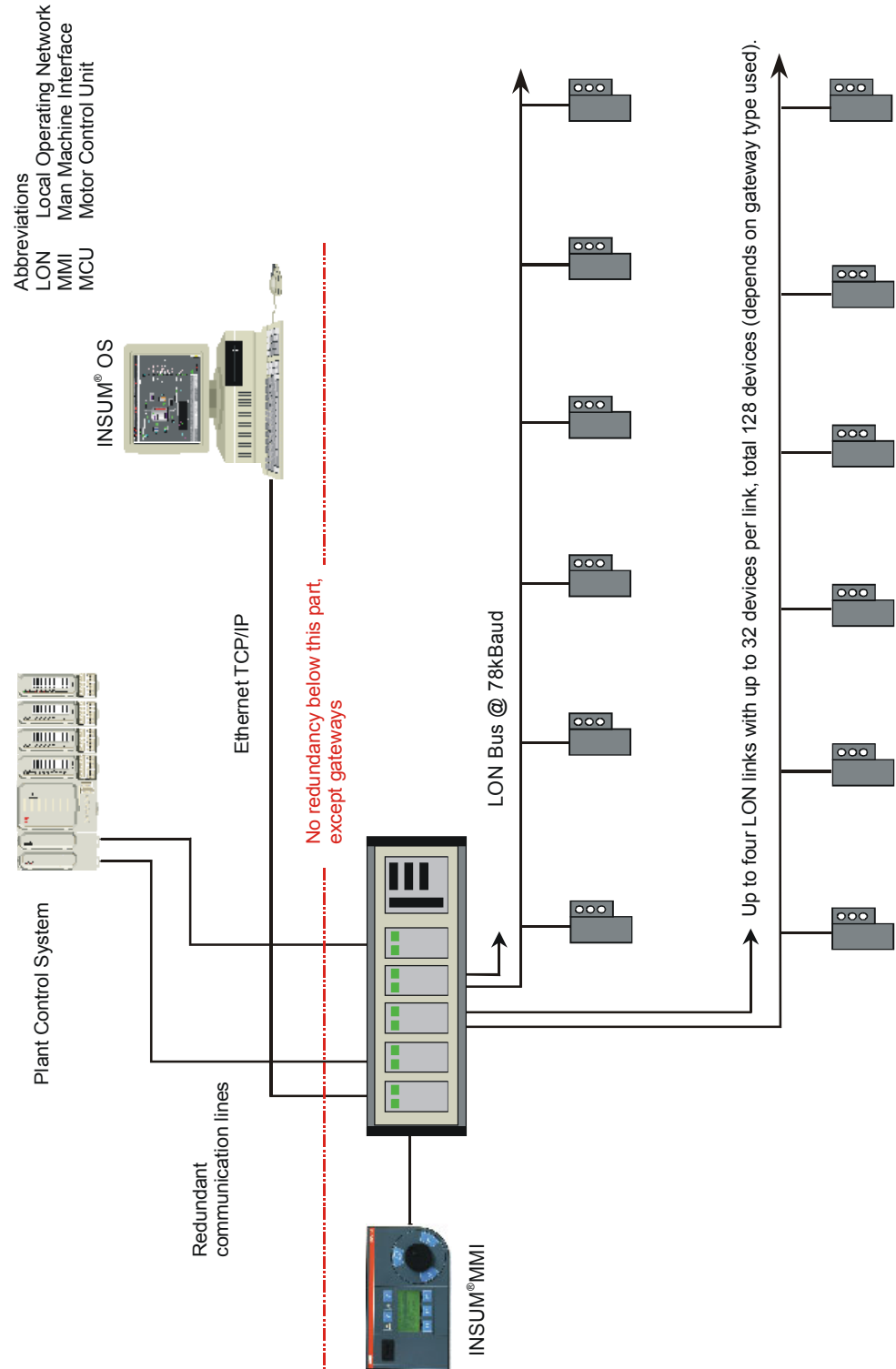
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3.2   **Schematic Dual Backplane Configuration**

Abbreviations
LON   Local Operating Network
MMI   Man Machine Interface
MCU   Motor Control Unit

INSUM® MMI

INSUM® OS

Plant Control System

Redundant communication lines

Ethernet TCP/IP

No redundancy below this part

Four LON links with up to 32 devices per link, total 128 devices (depends on gateway type used).

MCU

INSUM® MMI
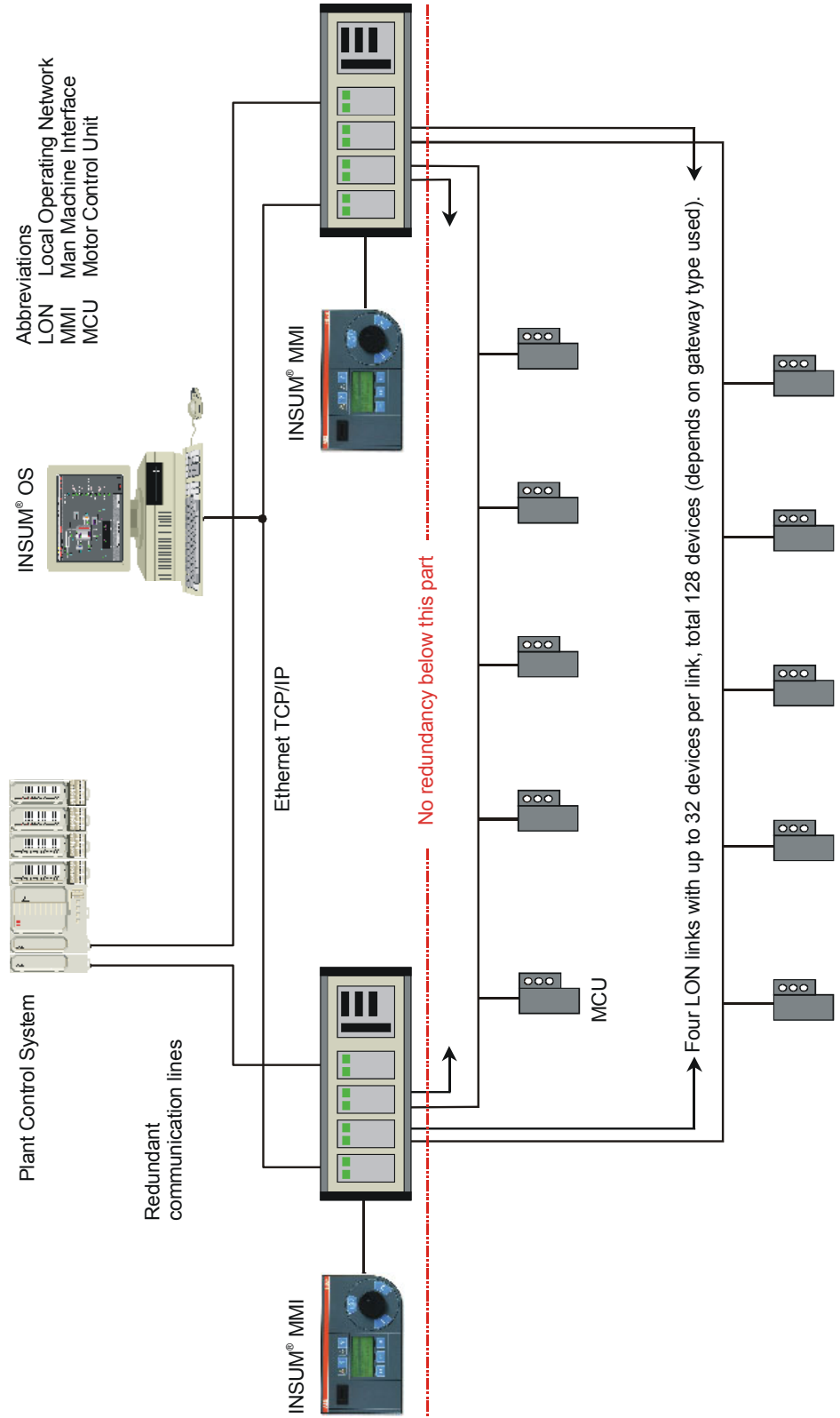
Picture 2.   Dual Backplane Configuration

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Annex A: INSUM Terms and Abbreviations

Abbreviation	Term	Explanation / Comments
	Alarm	Alarm is defined as status transition from any state to abnormal state. Status transition to abnormal state can be data crossing over the predefined alarm limit.
	Backplane	INSUM backbone, holds following INSUM devices: Router, Gateways, Clock, Power Supply. Part of the INSUM Communication Unit, see ICU
CA	Control Access	A function of INSUM system that allows definition of operating privileges for each device level (e.g. PCS, Gateway, field device)
CAT	Control Access Table	Table containing control access privileges
CB	Circuit Breaker	Circuit breaker unit (here: ABB SACE Emax with electronic release PR112-PD/LON)
CT	Current Transformer	Current Transformer
DCS	Distributed Control System	see also PCS
Eth	Ethernet	Ethernet is a local area network (LAN) technology. The Ethernet standard specifies the physical medium, access control rules and the message frames.
	Event	An event is a status transition from one state to another. It can be defined as alarm, if the state is defined as abnormal or as warning as a pre-alarm state.
FD	Field Device	Term for devices connected to the LON fieldbus (e.g. motor control units or circuit breaker protection)
FU	Field Unit	see Field Device
GPI	General Purpose Input	Digital input on MCU for general use
GPO	General Purpose Output	Digital output on MCU for general use
GPS	Global Positioning System	System to detect local position, universal time and time zone, GPS technology provides accurate time to a system
GW	Gateway	A Gateway is used as an interface between LON protocol in INSUM and other communication protocols (e.g. TCP/IP, PROFIBUS, MODBUS)
HMI	Human Machine Interface	Generic expression for switchgear level communication interfaces to field devices, either switchboard mounted or hand held
ICU	INSUM Communications Unit	INSUM Communications Unit consists of devices such as backplane, Gateways, Routers, System Clock and Power Supply. It provides the communication interface within INSUM and between INSUM and control systems. Formerly used expressions: SGC, SU
INSUM	INSUM	Integrated System for User optimized Motor Management. The concept of INSUM is to provide a platform for integration of smart components, apparatus and software tools for engineering and operation of the motor control switchgea
INSUM OS	INSUM Operator Station	Tool to parameterise, monitor and control devices in the INSUM system
ITS	Integrated Tier Switch	The Intelligent Tier Switch is an ABB SlimLine switch fuse with integrated sensors and microprocessor based electronics for measurement and surveillance
LON	Local Operating Network	LON is used as an abbreviation for LonWorks network. A variation of LON is used as a switchgear bus in the INSUM system

Notes:

Abbreviation	Term	Explanation / Comments
LonTalk	LonTalk protocol	Fieldbus communication protocol used in LonWorks networks
LonWorks	LonWorks network	A communication network built using LonWorks network technology, including e.g. Neuron chip and LonTalk protocol
MCU	Motor Control Unit	Motor Control Unit is a common name for a product range of electronic motor controller devices (field device) in INSUM. A MCU is located in a MNS motor starter, where its main tasks are protection, control and monitoring of motor and the related motor starter equipment.
MMI	Man Machine Interface	The switchgear level INSUM HMI device to parameterize and control communication and field devices.
MNS	MNS	ABB Modular Low Voltage Switchgear
	MODBUS, MODBUS RTU	Fieldbus communication protocol
NV,nv	LON Network Variable	Network variable is a data item in LonTalk protocol application containing max. 31 bytes of data.
Nvi, nvi	LON Network Variable input	LON bus input variable
Nvo, nvo	LON Network Variable output	LON bus output variable
OS	Operator Station	see INSUM OS
PCS	Process Control System	High level process control system
PLC	Programmable Local Controller	Low level control unit
PR	Programmable Release	Circuit breaker protection/release unit (here: ABB SACE Emax PR112-PD/LON)
	PROFIBUS DP	Fieldbus communication protocol with cyclic data transfer
	PROFIBUS DP-V1	Fieldbus communication protocol, extension of PROFIBUS DP allowing acyclic data transfer and multi master.
PTB	Physikalisch-Technische Bundesanstalt	Authorized body in Germany to approve Ex-e applications.
PTC	Positive Temperature Coefficient	A temperature sensitive resistor used to detect high motor temperature and to trip the motor if an alarm level is reached.
RCU	Remote Control Unit	Locally installed control device for motor starter, interacting directly with starter passing MCU for local operations.
	Router	Connection device in the LON network to interconnect different LON subnets. Part of the INSUM Communications Unit.
RTC	Real Time Clock	Part of the INSUM System Clock and and optionally time master of the INSUM system
SCADA	Supervisory Control and Data Acquisition	
SGC	Switchgear Controller	Former term used for INSUM Communications Unit
SU	Switchgear Unit	Former term used for INSUM Communications Unit
	System Clock	INSUM device providing time synchronisation between a time master and all MCUs. Part of the INSUM Communication Unit, see ICU
TCP/IP	Transmission Control Protocol /Internet Protocol	TCP/IP is a high-level, connection oriented, reliable, full duplex communication protocol developed for integration of the heterogenous systems.
TFLC	Thermal Full Load Current	See MCU Parameter Description for explanation

Notes:

Abbreviation	Term	Explanation / Comments
TOL	Thermal Overload	See MCU Parameter Description for explanation
	Trip	A consequence of an alarm activated or an external trip command from another device to stop the motor or trip the circuit breaker.
UTC	Coordinated Universal Time	Coordinated Universal Time is the international time standard, formerly referred to as Greenwich Meridian Time (GMT). Zero (0) hours UTC is midnight in Greenwich England, which lies on the zero longitudinal meridian. Universal time is based on a 24 hours clock.
VU	Voltage Unit	Voltage measurement and power supply unit for MCU 2
	Wink	The Wink function enables identifcation of a device on the LON network. When a device receives a Wink-message via the fieldbus, it responds with a visual indication (flashing LED)

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