Motor medical

Around-the-clock screening and protection of motor health

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No motor needs to be an island. Whereas electric motors were once considered connected when the bus bars and drive shaft were correctly attached, network connectivity is growing in importance. Communication networks are permitting advanced control, coordination, diagnosis and maintenance planning. Drawing on progress in embedded intelligence and fieldbus technology, ABB's MNS *i*S motor control center is a new advanced generation for low voltage MCC applications.

In a modern industrial environment, Intelligent Motor Control System (IMCS) technology is considered mature and is widely accepted. Following the emergence of open field bus technology more than a decade ago, intelligent switchgear has rapidly gained ground in terms of user confidence. Communication robustness and response time suitability make the technology reliable for real-time applications.

Additionally, the ongoing pursuit of lower equipment life-cycle costs has leveraged a platform for flexible engineering that provides shorter commissioning times, more information, better diagnosis, predictive maintenance and simplified troubleshooting all leading to less downtime.

IMCS technology is, however, in the midst of a further pivotal change. Customers are seeking further productivity gains through better overall plant uptime and coordination of operations and maintenance. Central to achieving this is delivery of the right information to the right people at the right time. This would not be possible without the appropriate embedded connectivity. System architecture and communication configurations are adapting to better meet this demand Table.

ABB was ahead of its time in recognizing this trend and reflecting it in its MNS *i*S switchgear. Significantly, ABB's implementation offers a scalable approach. This means customers can add, modify or enhance their system configurations at any stage of the project life cycle.

Internal Switchgear BUS: Robust and real time communication

MNS *i*S switchgear communication is Ethernet-based yet deterministic and real time. The ability of Ethernet for speed, robust performance, simplicity of network configuration and the ability to communicate with several starters simultaneously are fully exploited in MNS *i*S. However, the stigma of Ethernet being non deterministic was carefully avoided by embedding a Real Time Application Interface (RTAI) providing deterministic timing and fast task switching. RTnet was adopted as Ethernet network stack. RTnet implements UDP/IP[1)], ICMP[2)] and ARP[3)] in a deterministic manner. To avoid unpredictable collisions and congestions on Ethernet, an additional layer called RTmac controls the media access. The need for the switchgear network (Ethernet-switchgear bus) to be separate from the process control network (Ethernet-process control) is achieved by adopting the 10Base-I[4)] physical Ethernet standard.

Table Market trends for low voltage switchgears

Product aspects	Today's situation	Trends for tomorrow
Intelligence/ communications	Optional	Embedded (In-built by design)
Communication	Single master	Multiple mastership
DCS Communication	Connectivity	Meaningful integration
Configurations	Point to point	Multiple combinations yet highly optimized
Information	Too much and not in context	Pertinent and precise to operator need
Communication possibilities	Dedicated	Scalable and possible to enhance at any stage of project life cycle
Communication	Any fieldbus	Specific and Ethernet based

MNS *i*S system configuration variability

Process industry MCC applications require various different system configurations to meet different customer plant operation philosophies or site-dependent demands on information flow. In MNS *i*S the customer's external control system can access:

1) Motor starters via the central communication unit: This approach allows simultaneous access to multiple control locations on different communication interfaces.

2) Alternatively, direct fieldbus connection[5] to the individual motor starter level: This approach allows a single control station to access a specific motor starter.

The best of both the worlds can be achieved by combining the approaches 1 and 2. To add to customer confidence for higher plant availability redundant configuration is also supported.

MNS *i*S OPC Server capabilities

The OPC (OLE – Object Linking and Embedding – for Process Control) interface used in MNS *i*S worth mentioning. OPC is a standardized way of handling additional information that is not mission critical, but nevertheless important for successful plant operation and maintenance. Using OPC, customers can connect to operator stations, maintenance systems etc. directly without having to program DCS[6] or PLCs[7].

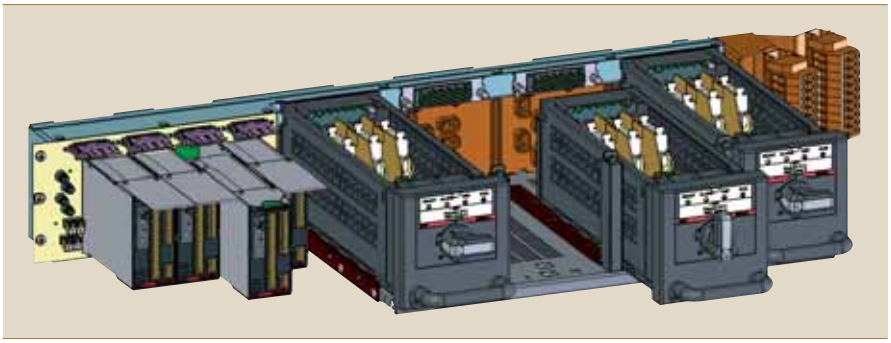
MNS iS all about information flow to the right operator at the right time.

By using OPC Servers provided within the scope of MNS *i*S, additional information for operators can be added to the faceplates without routing to DCS/PLC controllers. Alarm and event handling is totally automated so operator stations obtain motor-starter relevant alarms and time-tagged events directly from MNS *i*S. Alternatively, only the maintenance relevant information can be taken to the electrical maintenance system or SCADA package. With this approach the information required can be presented as required and where it is needed. There is no more need for "data routing programming" in the PLC's engendering huge engineering efforts or suboptimal PLC performance – no application programs needs to be implemented for data transfer.

MNS *i*S all about information flow to the right operator at the right time.

Motor control center

MNS *i*S offers great ease in handling



Advantages at a glance

- The MNS *i*S switchgear bus is built in. All MNS *i*S components on the switchgear bus are pluggable. Customers are relieved from the pains of wiring.
- MNS *i*S offers complete communication integrity with predictable behavior. The operational safety of motor is ensured against:
- Breakdown in communication- MNS *i*S continuously monitors the communication integrity from the motor starter to the external control system (DCS: Distributed Control System) at all times. Should communication break down, the motor is led to a pre-defined safe state.
- Unauthorized Motor Control- the MNS *i*S motor starter unit can be accessed from multiple control stations. Operational safety and integrity is safeguarded and unauthorized or unintended control operations prevented by controlled user access right mechanism.

MNS *i*S provides:

- DCS Communication on Industry Standard open field bus Profibus DP-V1, Modbus TCP and OPC Interface (Profinet implementation in pipeline)
- Web Browser connectivity for touch panel local HMI (Human Machine Interface)
- Direct field bus connectivity to motor starters on Profibus DP-V1, Device Net or Modbus RTU.*

* development pipeline

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Footnotes

[1] UDP (User Data Protocol) is a protocol on the transport level of the communication stack (see also the figure on page 47). It is faster than TCP but does not offer the same level of determinism or guarantee that packets are received in he order they are sent.

[2] ICMP (Internet Control Message Protocol) is a protocol on the network level of the communication stack (like IP). Its most frequent use is for sending error messages.

[3] ARP (Address Resolution Protocol) is another network level protocol. It resolves the hardware address of a device from its protocol address.

[4] 10Base-I is the physical layer of 10 Mbps Industrial Ethernet.

[5] Profinet implementation is in the pipeline.

[6] DCS: Distributed Control System

[7] PLC: Programmable Logic Controller