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**Title of TC:**

TC65, established in 1968, prepares basic standards for industrial automation as well as process industry specific standards. The Scopes of TC65 and its SCs are as follows:

**TC65: INDUSTRIAL PROCESS MEASUREMENT, CONTROL AND AUTOMATION**

To prepare international standards for systems and elements used for industrial process measurement, control and automation. To coordinate standardization activities which affect integration of components and functions into such systems including safety and security aspects. This work of standardization is to be carried out in the international fields for equipment and systems.

**SC65A: SYSTEM ASPECTS**

To prepare international standards regarding the generic aspects of systems used in industrial process measurement, control and manufacturing automation: operational conditions (including EMC), methodology for the assessment of systems, functional safety, etc.

SC65A also has a safety pilot function to prepare standards dealing with functional safety of electrical/electronic/programmable electronic systems.

**SC65B: MEASUREMENT AND CONTROL DEVICES**

To prepare international standards in the field of specific aspects of devices (hardware and software) used in industrial process measurement and control, such as measurement devices, analysing equipment, actuators, and programmable logic controllers, and covering such aspects as interchangeability, performance evaluation, and functionality definition.

**SC65C: INDUSTRIAL NETWORKS**

To prepare international standards on wired, optical and wireless industrial networks for industrial-process measurement, control and manufacturing automation, as well as for instrumentation systems used for research, development and testing purposes. The scope includes cabling, interoperability, co-existence and performance evaluation.

**SC65E: DEVICES AND INTEGRATION IN ENTERPRISE SYSTEMS**

To prepare international standards specifying:

- (1) Device integration with industrial automation systems. The models developed in these standards address device properties, classification, selection, configuration, commissioning, monitoring and basic diagnostics.
- (2) Industrial automation systems integration with enterprise systems. This includes transactions between business and manufacturing activities which may be jointly developed with ISO TC184.

## **A Background**

This is a brief history of TC 65:

### **London (1968) / Baden-Baden (1969)**

- Relationship between ISO TC124 and IEC TC65: French delegation expressed the point of view that only if these committees worked under IEC rules of procedure could fast progress be expected.
- WG4 develops 4..20 mA interface.

### **Washington (1970)**

#### **Scheveningen (1971)**

- Problems in cooperation with ISO TC124.
- Discussion of reorganization of IEC TC65 in order to continue the work of both TC65 and the former ISO TC124.
- IEC TC65 established a subcommittee with all WGs of ISO TC124.
- New title discussion, selected title: Industrial measurement and control.

#### **Munich (1973)**

- Language for meetings agreed to be English only with French where necessary.
- Two subcommittees established:
  - IEC SC65A: System consideration
  - IEC SC65B: Elements of Systems

#### **Moscow (1975)**

#### **Budapest (1976)**

- New Working Group proposal: "...concerned with industrial analyzing systems...", main scope: Process Analysis.

#### **Florence (1978)**

- New topic: Electromagnetic Interference.
- First discussions on "Logic and sequence control" (today's PLCs)

#### **Philadelphia (1979)**

- PROWAY C discussion.
- Process Analyzers: Building up a group for Process Analyzers in IEC SC66D was unsuccessful → Question of principle to Committee of Action (now called SMB).
- New subject: "Control Systems for Discontinuous Industrial Process".

#### **Oslo (1981)**

- ...once TC66 was "laboratory instrumentation" and TC65 "industrial instrumentation". This was changed when SC66D dealt with process analyzers and SC65C dealt with laboratory buses...that the red line border between the two TCs was becoming dotted and advocated a pragmatic approach for each case where conflict arose...
- Preliminary Scope of IEC SC65C: To prepare International Standards and to maintain existing International Standards dealing with data communication bus systems for industrial process and laboratory and equivalent measurement and control.
- Merger of IEC TC66 WG3 and IEC SC65A WG6 / WG7 into IEC SC65C (all communications).

#### **Nice (1983)**

- First Report of SC65C meeting, held on 9/10-March-1983: 31 delegates from 17 countries, PROWAY is adopted.

#### **Berlin (1986)**

- Topic "Graphical Symbols and identifying letters for industrial measurement and control functions and instrumentations"; forms a Joint Working Group with ISO TC10 SC3
- TC65 WG3 "Safety Aspects specific to TC65 applications".

### **Stockholm (1988)**

- European Commission (EC) asks for IEC TC65 documents.
- Reorganization issue: formal vote on the formation of a Special Working Group.

### **Raleigh (1990)**

- The term “Companion Standard” appears.
- Set up of the Advisory Group.
- New Structure of IEC TC65:
  - TC65: Industrial measurement and control.
  - SC65A: System Aspects.
  - SC65B: Devices.
  - SC65C: Digital Communications.
- Czechoslovak Committee proposes an ISO/IEC JTC2 “Industrial Automation” which was rejected.
- New Work Items (NWI): Batch Control Systems (new WG in SC65A) and Function Blocks (new WG in TC65)

### **Fribourg (1991)**

- Strategic Policy Statement (SPS) document appears.

### **Paris (1993)**

- IEC SC66D transferred to IEC TC65 as SC65D in 1992.

### **Milan (1994)**

- Question of principle regarding IEC TC66 scope was satisfactorily resolved by the addition of a note to the TC66 scope.
- First Introduction of Device Description Language (DDL) as proposed by UK.

### **Montreal (1996)**

- Many basic Fieldbus activities are started in IEC SC65C

### **Helsinki (1997)**

- A special liaison between ISO TC 184 SC5 (Use of CAN in Industrial Automation) and IEC SC 17B (low voltage switchgear and controlgear) is set up.
- Special liaisons between:
  - IEC TC 77 (EMC) and SC 65A
  - IEC SC 3B (documentation), SC 3D (Data sets for libraries of electric components data) and SC 65B
  - ISO 199 (Safety of machinery) and SC 65A and also SC 65B
  - ISO TC 159 (Ergonomics)

### **Houston (1998)**

- Many IEC SC65C related discussions according to voting procedures
- Six ongoing Fieldbus standardization projects in IEC SC65C, WG 6
- New main recommendations for International Standards from Sector Board 3
- New IEC directives for the development of new projects and maintenance of the others
- ITAs and PASs presentation and future expected use
- First FSCG meeting (Functional Safety Coordination Group)

### **Cape Town (2000)**

- Parts of IEC 61158 are moved from IEC SC65C to MT9
- Proposals for NP: Enterprise – Control system integration (later MES)
- Proposals for NP: Device profiles
- Start of the revision of two “fundamental” series of standards: 61508 and 61158

### **Beijing (2002)**

- IEC TC65 encourages further National Committees to nominate experts for WG1: Terms and Definitions.
- Excellent progress on the common device profiles approach
- Agreed that IEC/SC 65D remain as a sub-committee.

### **Madrid (2003)**

- IEC TC65 SCs and WGs are asked to provide relevant terms and definitions to WG1 as input for IEC International Electrotechnical Vocabulary
- IEC TC65 welcomes the approved IEC PAS 62390 on common automation device profiles
- Agreement to keep the NP on Safety and Security for communications within SC65C

### **Ottawa (2005)**

- Creation of a task force to reorganize TC65
- Introduction of “Product Properties and Classification on technical domain” covered by TC65
- Synchronizing of work between ISO TC184 SC4, ISO TC184 and ISO/IEC JWG1

### **Berlin (2006)**

- New Structure of IEC TC65 becomes effective:
  - TC65: Industrial Process Measurement, Control and Automation
  - SC65A: System Aspects
  - SC65B: Devices and Process Analysis
  - SC65C: Industrial Networks
  - SC65E: Devices and Integration in Enterprise Systems
- First automation forum

### **Tokyo (2008)**

- 2<sup>nd</sup> Automation forum with the participation of Japanese industry

### **Geneva (2009)**

- Liaisons to IEC TC57 / WG15; ISA99; ISO/IEC JTC1 SC27; IEC SC45A / WG9; ITU SG17
- Excellent efforts with ISO TC184 in the area of Digital Enterprise and Digital Factory

## **B Business Environment**

### **B.1 General**

According to a study by the ARC Advisory Group the total worldwide market for automation services had expanded to close to \$17.3 billion at the end of 2008, despite adverse conditions in the automation marketplace, and will increase by a compound annual growth rate of 7% over the coming years. Major companies in the area of automation are Emerson Process Management, Honeywell, Invensys, Rockwell, Phoenix, Contact, Schneider Electric and Siemens but also SMEs like Endress+Hauser, Samson, Krohne, and others. There are about a thousand vendor companies in the market worldwide. Most of the companies and many customers are organized in important consortia such as:

- Fieldbus Foundation
- HART Foundation
- ODVA
- PROFIBUS User Organization and others.

Continuing expansion of the global market for industrial automation equipment demands further international harmonization of safety and security aspects as well as interoperability and easier systems/device integration in multi-vendor environments. Interfaces and generic models are becoming the most important subjects for standardization in conjunction with the increased adoption of widely-used IT solutions and de-facto standards within automation applications. A shift from proprietary to open automation interfaces has the world-wide support of both large and small vendors. On one hand industrial automation users and suppliers are faced with extremely rapid innovation and high market competition. On the other hand standardization must guarantee solutions which take into account the long lifetime expected for automation equipment requiring also coexistence of several generations of equipment.

The overall harmonization process based on consensus is considered not fast enough. As a result standardization procedures have been tightened in recent years. But some problems cannot be eliminated because of the complexity of the technical work and the need to find appropriate solutions acceptable to most people in a working group and later to national committees.

## B.2 Market demand

### General

IEC standards issued by TC65 and its SCs are widely used by:

- Manufacturers of automation devices and systems,
- Designers, integrators and builders of automation installations,
- Users and operators (e.g. producers of goods), and
- Regulators and auditors who ensure compliance to requirements

Most standardization work is done by manufacturers. To attract end-users for active participation in standardization work is often difficult.

### IEC schemes

There is no standard yet for use in CB schemes. However work in TC65 JWG13 is focused on creating a new CB scheme “Industrial” in cooperation with IEC TC66.

Almost all standards developed in TC65 are not used for regulation purposes. However, it is expected that recent cyber security, electrical safety and energy efficiency related standardization work will lead to it being referred by regulation authorities.

### Competing standards

TC65 is making continuous efforts to avoid other TCs or organizations drafting competing standards. However there have been and there are examples of competing standards such as those currently being developed by ISO/IEC JTC1 WG7.

### Customers of publications

The table below indicates customers of TC65 publications by each Technical Committee:

	Publication Example	Customers
<b>TC65</b>	IEC 60050-351 (IEV vocabulary)	All: Manufacturers, Designers, Users and Regulators
	IEC 61010 (Safety requirements for equipment)	Manufacturers and Regulators
	IEC 62443 (Cyber security)	All
	IEC 62708 (Documentation requirements)	All
<b>SC65A</b>	IEC 61326 (EMC)	Manufacturers and Users
	IEC 61508 Series (Functional Safety)	Manufacturers and Users
	IEC 61511 (Functional Safety process industry sector)	Manufacturers and Users
	IEC 61512 (Batch Control)	Manufacturers and Users
<b>SC65B</b>	IEC 61131 (PLC)	Manufacturers and Users
	IEC 61499 (Function Block)	Manufacturers and Users
	IEC 60534 (Industrial-process control valves)	Manufacturers and Users
	IEC 61207 (Expression of performance of gas analyzers)	Manufacturers and Users
<b>SC65C</b>	IEC 61158 Series (Fieldbus)	Manufacturers
	IEC 61588 (Precision clock synchronization)	Manufacturers, Designers and Users
	IEC 61784 (Industrial communication networks – Profiles)	Manufacturers, Designers, and Users
	IEC 61918 (Cabling)	Manufacturers, Designers, and Users
	IEC 62439 (High availability automation networks)	Manufacturers, Designers and Users
	IEC 62591, IEC 62601, IEC 62734 (Wireless)	Manufacturers and Users
	IEC 62657 (Wireless coexistence)	Manufacturers, Designers, Users and Regulators

	Publication Example	Customers
<b>SC65E</b>	IEC 61987 (Electronic catalogues)	Manufacturers and Users
	IEC 62264 (Enterprise-control system integration)	Manufacturers and Users
	IEC 61804 (Function Blocks Process Control and EDDL)	Manufacturers and Users
	IEC 61499 (Generic Function Blocks Distributed Control)	Manufacturers and Users
	IEC 62337 (Commissioning)	Manufacturers and Users
	IEC 62381 (FAT, SAT, and SIT)	Manufacturers and Users
	IEC 62382 (Electrical and Instrumentation Loop Check)	Manufacturers and Users
	IEC 62541 (OPC UA)	Manufacturers and Users
	IEC 62543 (FDT)	Manufacturers and Users
	IEC 62714 (Automation-ML)	Manufacturers and Users

### B.3 Trends in technology

The tremendous impact of information technology and communications (ITC) at all levels, increased complexity of equipment (e.g. replacement of hardware by software functions). Migration towards common equipment and solutions for a variety of industry sectors, the shift from centralized to distributed functionality, and the dominance of system and integration aspects has significant impact on the future work of IEC TC 65 and its SCs. There are also some indications that functions which have been decentralized in the past will be centralized again in so called "Clouds".

Common functionalities in a plant like functional safety (FS) but also the properties of automation devices in terms of electromagnetic compatibility (EMC) are subject of work in IEC SC65A. Most of the device related work is located in IEC SC65B. Communication related topics are dealt in IEC SC65C, including wireless (radio) communications. The support of the overall lifecycle of a plant will be currently improved with stress on the engineering phase of a plant. This is subject of standardization mainly in IEC SC65E.

Finally the mother committee IEC TC65 deals with global issues like terms and definitions, overall security, Digital Factory and others.

### B.4 Market trends

The standardization of systems, communications and devices will continue. In addition, the growing requirement to meet improved environmental stewardship, energy efficiency, and human accessibility demands will place increased demands on standardization and increase the likelihood that some standards will be referenced by regulation authorities.

The components of a plant will be designed in the future by picking up their electronic representation (electronic data sheet). Therefore some future IEC standards will be available as data bases in order to directly support the whole life cycle of a plant.

The trend on the customer side to define application processes, has the impact that standards to be used in processes have to fit together in terms of terminology and contents. Therefore some harmonization is needed not only in terminology but also in contents fitting better together. Some process oriented standards have already been created.

The overall aim is to support the so called "digital factory" which is the virtual representation of a real plant in factory and process automation stored in a data repository including tools supporting relevant processes.

Energy efficiency and the minimization of a plant's impact on the environment are common goals across the industry. While designers will tend to specify low power consumption devices and equipment, overall plant efficiency and environmental stewardship will dominate design decisions. Increased plant efficiency, safety and security may lead to the deployment of more, and more sophisticated, control equipment.

The subjects mentioned above were already been considered during the reorganization of IEC TC65 in 2005/2006. So IEC TC65 is well prepared for these trends.

## B.5 Ecological environment

Today's automation technology also takes into account such issues as protection of the environment and saving of energy and resources in addition to the original aims of controlling production processes in the most economical way with the highest regard to both safety and quality. Those requirements are fully addressed by IEC TC65 and its 4 SCs. Initiated by the IEC SMB IEC TC65 invited in 2010 to two workshops on Energy Efficiency in Automation with the result of creating the new JWG14 across IEC TCs dealing with automation technology as they are:

- IEC TC2
- IEC SC17B
- IEC SC22G
- IEC TC23
- IEC TC65
- ISO TC184

Environmental standards are increasingly relevant because they may contain some restrictions for product development. This requires a closer cooperation between IEC TC 111 and the relevant product committees. Therefore a liaison was established in 2011.

## C System approach aspects

TC65 is a system and a product committee at the same time. IEC TC65 and its 4 SCs has been system oriented for a long time and system conformity of products is permanently in the scope of all TC 65 Committees.

Examples are:

- Functional Safety which can only be achieved if the components contain specific properties in order realize a certain safety integrity level;
- Communications with protocols known in each of the connected devices;
- Device integration using a common methodology to connect devices in a specific application.

In fact Functional Safety is a very good example of an advanced system approach. All components of functional safe application must fulfil all system requirements otherwise the specific safety integrity level (SIL) will not be achieved.

In order to standardize all necessary system related aspects there is a need for interaction and coordination between the different committees dealing with automation subjects. IEC TC65 understands its role as a turntable of information and a service for coordination.

The following table shows the roles of IEC TC65 with its SCs with a selection of relationships to other international standardization committees (without consortia) in order to support information flow.

In order to describe automation related items and their relationship a model paper has been specified in March 2011.

<b>Component committee (TC65 role of a customer)</b>	IEC TC1	International Electrical Vocabulary (IEV)
	IEC SC3D	Component data dictionary (IEC 61360)
	IEC TC46	Cables, wires and accessories
	IEC SC48B	Connectors
	IEC TC86	Fibre Optics
	IEC TC111	Environmental aspects
	ISO TC37	Product classification
	ISO TC184 SC4 / SC5	Format data exchange
	ISO/IEC JTC 1/SC 25	Interconnection of IT equipment

<b>System committee (TC65 role of supplier)</b>	IEC SC3D	Component data dictionary Sensor and actuator
	IEC SC17B	IEC 61987-10
	IEC SC22G	IEC 61987-10
	IEC TC44	IEC 61508 – IEC 61511
	IEC TC66	IEC 61508, IEC 61010-2-201
	IEC TC77	IEC 61326
	ISO 184	Communications
<b>Others (System to System)</b>	ISO/IEC JTC 1/SC 25	Interconnection of IT equipment

#### D Objectives and strategies

<b>TC65</b>	<p>The following action plans are drawn up:</p> <ul style="list-style-type: none"> <li>• To keep the IEC 351 (Electropedia) updated</li> <li>• To provide a frame work for Network and System Security</li> <li>• To support document stacks for plant installations</li> <li>• To harmonize product safety issues including CB scheme</li> <li>• To provide a framework for Energy Efficiency in Automation</li> <li>• To deal with new emerging technologies potentially relevant in automation</li> </ul>
<b>SC65A</b>	<p>The following action plans are drawn up:</p> <ul style="list-style-type: none"> <li>• To pursue the objectives specified by TC 65 detailed above (ongoing)</li> <li>• To specify the system environment as prerequisite for the interaction of devices (ongoing)</li> <li>• To revise the IEC 61326 series (Publication 2012-07)</li> <li>• To revise IEC 61511 Parts 1,2 and 3 (projects expected to be established by 2011-12)</li> <li>• To develop IEC 62682 Management of Alarm Systems for the Process Industries (Publication 2013-11)</li> <li>• To act as functional safety resource to other TC's, SC's and WG's while maintaining IEC 61508 as the horizontal standard for functional safety.</li> </ul>
<b>SC65B</b>	<p>The following action plans are drawn up:</p> <ul style="list-style-type: none"> <li>• Improve speed of standardization work: Conduct training on drafting, style guides, templates and collaboration tools</li> </ul>
<b>SC65C</b>	<p>The following action plans are drawn up:</p> <ul style="list-style-type: none"> <li>• To maintain and support the fieldbus standards (IEC 62158 and 62784), and the emerging wireless industrial standards</li> <li>• To develop approaches for the coexistence of wireless networks in industrial environments, including suitable interactions with wireless regulatory bodies</li> <li>• To update the fieldbus standards as necessary to meet safety and emerging security requirements, including the security requirements identified in the TC65 security framework.</li> </ul>
<b>SC65E</b>	<p>The following action plans are drawn up:</p> <ul style="list-style-type: none"> <li>• To maintain and support the exchange of data between Enterprise and Factory (IEC62264 and IEC62541)</li> <li>• To increase efficiency during the engineering phase (IEC 62714)</li> <li>• To improve the device integration in harmonizing EDDL (IEC 62804-2) and FDT (IEC 62453)</li> </ul>



## E Action plan

To achieve the above objectives, TC 65 and its 4 SCs take actions as follows:

- Continue work in 36 working groups
- Consider the system aspect and improve system capabilities of components
- Consider in each new work the energy efficiency issue and the environmental aspects
- Harmonize standards in automation in order to support customer processes better
- Keep contact with relevant other committees
- Improve speed of standardization work
- Strengthen liaison ship with ISO TC 184 and telecommunication organizations like ITU/ETS and others

In each TC, the following action plans are drawn up:

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## F Useful links to IEC web site

[IEC/TC 65 dashboard](#) giving access to Membership, TC/SC Officers, Scope, Liaisons, WG/MT/PT structure, Publications issued along with their stability dates and Work Programme and similar information for SCs, if any.

Name or signature of the secretary



Bernard Dumortier  
TC65 Secretary