NATIONAL SKILLS COMPETITION

Competitions Sub-Committee

INDUSTRIAL ELECTRONICS

(IMIE #1)

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INTRODUCTION

WorldSkills Jamaica, by a resolution of the National Organizing Committee and in accordance with the Constitution, the Standing Orders and the Competition Rules, has adopted the following minimum requirements for this skill for the National Skills Competition.

The Technical Description consists of the following:

- Section 1 – Technical/Competition Description (TD)
- Section 2 – Project Design Criteria (PD)
- Section 3 – Skill Management Procedures (SM)
- Section 4 – Workshop Setup (WS)
- Section 5 – Infrastructure List (IL)
- Section 6 – Appendices

Effective 01.04.07

Grace Mclean (GM)
Chairman, Competition Committee
01.04.07

Daphne Simmonds
Co-Chair

NATIONAL SKILLS COMPETITION

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The National Skills Competitions Sub-Committee has adopted the following minimum requirements for applicants' entry in the Skills Jamaica Competition.

The effective date will be that date on which this document is issued, and is subject to change by the Skills Jamaica Competition Steering Committee.

1. NAME AND DESCRIPTION OF SKILL

1.1 The name of the skill is:

1.1.1. Industrial Electronics

1.2 The Industrial Electronics Technician works in industrial or commercial environments and works with or studies electronics. This includes:

- Development
- Construction
- Design
- Measuring
- Testing
- Repair

1.3 This technical description must be known to every candidate.

1.4 Words implying masculine gender only shall include the feminine gender

2. SCOPE OF WORK AT COMPETITION

2.1 The practical work will test the competitors ability in any two of the following:

- Assemble, adjust, commission, measure and test electronic equipment
- Carry out and document measurements on analogue and digital circuits

- Locate, document and repair faults in a given circuit
- Design or refine a design of a circuit, and construct using prototype
- Construction techniques

2.2 To solve theoretical tasks using mathematical and graphical methods to a Technician Level

2.3 To redraw a circuit drawing schematic with Computer Aided Design.

- Design, installation, commissioning and maintenance of software driven electrically controlled equipment.

2.3 PRACTICAL WORK

3.1 Assembling

Assemble a project that has to be from a kit of parts to the IPC-A-610 issue C international acceptability of electronic assemblies. (Web page WWW.solder.net/main/ipca/htm. Each project should be able to fit a Euro card standard using DIN 41612 F64 or F32 connectors, that will fit a standard back plane connector. Power points will be as follows: -

A1	C1	+5v Digital
A2	C2	Digital Ground
A15		+5v Analog
	C15	+12v Analog
A16	C16	Analog Ground
A17		-5v Analog
	C17	-12v Analog
A31	C31	Digital Ground
A32	C32	+5v Digital

3.2 Measuring and Testing

To work with conventional measuring and testing equipment for AC, DC, digital and analog electronics. To test, set, adjust and measure electronic components, modules and equipment. To record and analyse measured results. Boards **will be pre-built** before the competition.

3.3 Fault Finding and Repair

To test, locate and effect repairs on a printed circuit board, surface mount board or mixed technology board. All surface mount components to have no more than four pins and Fault finding method/procedure with results will be required. All boards will be pre-built before the competition. Each board will have at least three faults. Pin configurations and power supply will be as 3.0.

Competitors may bring their own measuring instruments.

3.4 Prototype Design

To carry out a simple electronic design using given components to meet a given specification. Printed circuit boards should be pre-built. Resistors E24 series, 0.25 watt to be made available. No more than 15 wire wrap connections and no more 15-point to point connections will be required on this module. Pin configurations and power supply will be as 3.0.

Competitors may bring their own measurement instruments.

3.5 The competition is modular and will be marked at the end of every module.

3.6 Time allowed for each module is as follows:

Theory	1 hour
Drawing	1 hour
Prototype	1 hour

Fault Finding	2 hours
Measurement	1 hour
Assembly Project	4 hours

3. SKILL MANAGEMENT PROCEDURES (SM)

3.1 DOCUMENTS REQUIRED

3.1.1 The Chief Expert will have available a current copy of all documents associated with this skill for the Competition.

3.1.2 The documents required are:

- Technical Description
- Competition Rules
- Health and Safety documents
- QAMS – all documents
- Any other documents referred to in the documents listed above.

3.1.3 While it is understood that the Chief Expert will have a copy of these documents in there shall also be a complete set that is available for the experts and other competition workers.

3.1.4 The Chief Expert is expected to have a sound knowledge of the requirements and procedures specified in the documentation.

3.1.5 The Jury President is expected to have a thorough knowledge and understanding of the requirements and procedures specified in the documentation.

PRE-COMPETITION RESPONSIBILITIES

3.2.1 In the period between one National Skills Competition and the next, the elected Chief Expert is responsible to ensure that the requirements of Section 2 – Project Design Criteria are complied with.

SKILL MANAGEMENT PROCEDURES FOR THE CHIEF EXPERTS

The following speaks to the procedures prior to and during the Competition

3.3.1 The procedures specified below must be adhered to.

3.3.2 On arrival at the Competition site for the first time, the Chief Expert must:

- Welcome the experts and ensure introductions are made
- Inform them of their duties and responsibilities in terms of the Competition Rules and Standing Orders
- Ensure that the project is endorsed by all the experts and that a copy is signed by all the experts

3.3.3 The Chief Expert will then divide the experts into teams for the following activities:

- Verify that the material on site is appropriate and sufficient
- Verify again that the quantities of material as specified on the material list is accurate
- Develop a program for the competitors to complete the modules
- Develop timetables for activities
- Set up equipment
- Confirm that the layout, work areas and equipment are in accordance with the workshop setup requirements
- Confirm that all machinery/equipment is in a safe working order
- Confirm that all workstations/machinery/equipment are in accordance with the plan, and that they are numbered

- Confirm that there is sufficient illumination
- Confirm that there is sufficient space for the competitors to work efficiently
- Confirm that the barriers are far enough removed from the competitors to ensure that there will be no interference, and if they are not, set up a roster among the experts to police the area during the Competition
- If necessary, set up duty rosters for activities during the Competition – e.g. keeping watch during lunch, preventing access of unauthorised persons, etc

3.3.4 The Chief Expert will then divide the experts into teams for purpose of marking and setting up marking schedules in accordance with the requirements.

3.3.5 Suggestions and comments for the revision and improvement of the Technical Description are to be provided to the Deputy Chief Expert in writing. The Deputy Chief Expert will reduce the information to a single typed document ready for discussion by all experts. Prior to leaving the Competition site, the Chief Expert, the Deputy Chief Expert and the Jury President will facilitate the discussion and revision of the Technical Description.

3.3.6 At any time that a unanimous decision is not achieved within a reasonable time, the Chief Expert will put the matter under discussion to the vote. A majority will be 50% of the experts present plus one. This decision will be final. In the event that an expert is absent at the time that the vote takes place, he/she has the right to be informed of the decision but the matter will not be raised again or voted upon again. The exception to this majority rule will be in the case of approval of the changes to the Technical Description, where the majority of 80% is required.

3.3.7 In the event that an extension of time is requested for the Competition to exceed the allotted hours, the matter must be discussed with the Jury President. All possible alternative solutions must be investigated before approval of an extension of time is requested, or will be approved.

3.3.8 Prior to the end of the Competition, the Jury President will facilitate the selection of the Chief Expert and Deputy Chief Expert for the next national Skills Competition.

3.3.9 Experts are eligible for selection as a Chief Expert if they:

- Have attended the National Skills Competition at least twice before (if less than 4 experts have been to the National Skills Competition before, this criterion may be relaxed at the discretion of the Jury President)
- Demonstrate a high degree of expertise in the skill
- Demonstrate leadership qualities.
- Are competent using a computer and the Internet – specifically to facilitate the Discussion Forum for their skill category.

3.3.10 The process by which selection will take place is by secret ballot and is as follows:

- Each expert present will list their choice of three experts in order of preference • The Jury President will allocate a score of three (3) points to each experts first preference, two (2) points to the second preference and one (1) point to the third preference
- The Jury President will then calculate total scores and announce the three highest scoring experts
- The expert with the highest score will be appointed Chief Expert for the next National Skills Competition
- If the first choice cannot attend, then the second choice will be Chief Expert

• If the first and second choice cannot attend, then the third choice will attend

• If none of the choices can attend, then the jury president will appoint, or facilitate the appointment of a Chief Expert

• The names of the selected experts will be entered into the provided documentation and signed by the Jury President and returned to the co-chair of the competitions committee.

3.3.11 Changes to the method of Competition design or suggestions offered for the next Competition design process or tasks must be written down and signed by 80% of the experts.

3.3.12 The Deputy Chief Expert's primary role is to ensure that the Technical Description is updated to reflect the technological advances of the skill category and include overall improvements for the preparation and running of the Competition. He/she will ensure that all changes to the Technical Description are entered, that all experts sign it, and that it is delivered to the co-chair of the competitions committee as a hard copy and digitally.

3.3.13 The Deputy Chief Expert also assists in the distribution and collection of the QAMS Audit Questionnaires and assists the Chief Expert where necessary.

HONESTY AND TRANSPARENCY

3.4.1 The competitors that attend the National Skills Competition have the right to expect fair and honest treatment during the Competition in terms of the following:

• Instructions that are clear and unambiguous

• Marking schedules that provide no advantage to an opposing competitor

- All necessary equipment and material specified within the skill documentation that are required to complete the Competition
- The assistance necessary from judges and officials to ensure that he is able to complete the project. (The assistance deemed necessary will be provided equally and at the same time to all competitors present)
- No undue interference by officials or spectators that may hinder them in the completion of their project

3.4.2 Every competitor has the right to expect and demand that no opposing competitors will receive undue or unfair assistance or intervention that may provide that opposing competitor with an unfair advantage.

3.4.3 All officials and judges present on the Competition site are expected to ensure that paragraphs 3.4.1 and 3.4.2 above are complied with and maintained.

3.4.4 It is the responsibility of the Chief Expert or his Deputy to ensure that all competitors, interpreters, officials and judges comply with and maintain the integrity of the Competition, and additionally ensure that all necessary steps are taken to ensure that:

- Outside influences do not unduly improve or decrease competitors' abilities to provide a worthy performance.

3.4.5 A briefing will be provided to all experts and competitors on the requirements for integrity during the Competition.

3.4.6 Additionally, the Chief Expert is expected to identify these and any other factors that may exist on the Competition site that may results in the contravention of paragraphs 3.4.1 and 3.4.2 above, and reduce them to a checklist for continuous reference.

3.4.7 In the event that any competitor, judge, official, observer or competitor compatriot is found to be attempting to gain or provide assistance in any form that may result in an unfair advantage, the Chief Expert is to immediately refer the matter to the Jury President.

3.4.8 The Chief Expert will receive nominations and appoint a Security Officer whose responsibility it will be to ensure that these requirements are carried out.

3.4.9 It will be explained to all experts and competitors that nothing is to come in or out of the site unless specified by the Chief Expert as being allowed after being briefed on this topic.

3.4.10 Security checks will be carried out each day on experts and competitors (by experts and competitors) upon entry and exit to the site.

INFORMATION POLICY

3.9.1 During the competition a modified project plan without measurements is to be made available to the public.

4. THEORETICAL KNOWLEDGE

4.1 To solve theoretical problems, using mathematical and graphical methods based on the following:

- Fundamental electronic principles:
    1. Basics of AC and DC technology.
    2. Two ports LRC networks, resistive networks with up to three meshes.
    3. RC oscillators

- Components in Electronics:

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Properties, behaviour, characteristics and application (elementary circuits) of mechanically, electrically and physically adjustable components i.e.:

- Resistors
- Capacitors
- Coils
- Transformers
- Diodes: rectifying diodes, switch diodes, zener diodes, capacitive diodes, PIN diodes
- Trigger components: diac, triac, thyristor and uni-junction transistors.

- Multistage and special amplifier circuits:

  Basic amplifier circuits (AC, DC and power amplifiers)

  Differential amplifiers/operational amplifiers.

  1. Ideal operational amplifier: (infinite input resistance, zero output resistance and infinite open loop grain) Basic circuits with operational amplifier, analogue adder and subtractor, differentiator, comparator, impedance transducer.
  2. Real operational amplifier: Offset voltage and offset current, compensation, common mode gain and rejection, temperature drift, frequency response.

- Generators and Pulse shapers:

  1. Generators for sine wave voltage: RC, quartz, LC oscillator; wien bridge generator, phase generator.
  2. Pulse shaper: Schmitt trigger, differentiator, integrator.

- Digital Electronics
  1. Basic logic gates.
  2. Level switching function, function table, pulse, diagram, circuit symbols (table in appendix).
  3. Properties of basic gates AND, OR, NOT, NAND, NOR, EXCLUSIVE OR EXCLUSIVE NOR.
  4. Substituting basic NAND or NOR gates for basic gates.
  5. Creating switching functions from given circuits and vice versa.
  6. Making function table from circuit diagrams and switching functions.
  7. Simplifying switching networks using Karnaugh diagram or mathematical techniques.
  8. Flip-flops; RS Flip-flop, D Flip-flop, JK Master slave Flip-flop (especially counter circuits, shift register and frequency divider).
  9. Memory circuits, selection, addressing, and memory decoding volume.

- Software Programming
  - Competitors must be able to write programmes to control a PLC machine.

5. MATERIALS

5.1 Components

The workshop master must ensure that the materials provided are completed, packed in bags and checked also for the power supply project, and range of E24, 0.25w resistors from 10 ohm to 10 megohms is supplied.

5.2 Other materials

a. Graph paper A3 size
b. Solder 60/40 type
c. Approx. 5m bare wire (0.5mm diameter) per competitor
d. Approx. 5m each of insulated wire (or standard wire) in five different colours for each competitor
e. Binding/insulation tape
f. Lacing string /Tie raps/heat shrink sleeving
g. Hot-air fan for heat-shrink tubing

5.3 Clothing

Work clothes must comply with relevant safety standards. Safety standards require a minimum of safety glasses and covered footwear.

6. WORKSHOP INSTALLATIONS

6.1 The working area should provide enough space for the competitors, experts (jury), measurement and repair area, material cupboards and wardrobes.

- General Requirements

The working area should provide enough space for the competitors, expert's (jury), measurement and repair area, material cupboards and wardrobes.

Lockable cupboards must be provided for the safe keeping of the materials and the examination papers under the responsibility of the chief expert.

The organizers will provide four sets of the following for the experts:

1. 4 x Hot-air fan for heat-shrink tubing

2. 2 x Magnifiers for experts x3 or x5
3. 2 x Computers
4. One Laser printer

6.2 The personal working area for each competitor should be about 3m x 3m, and shall also allow for the equipment and machines specified.

6.3 Measuring Instruments and Tester/Tools

The organisers will provide the following for each competitor:

1. 1x universal DVM
2. 1x Function generator 1-50 MHz, sine, square, triangle
3. 1x stabilized power supply (3-30V adjustable)
4. Various connection cables (if necessary, coax cable with BNC plugs)
5. 1x Bench Lamp
6. 1x Electrostatic workstation
7. 1x Calculator, non-progammable

The organizers will also provide a spare set of the above for the experts.

6.5 Competitors must bring all their own tools, including wire-wrapping equipment. Measurement instruments are optional.

7. TEST PROJECT MARKING

7.1 The experts will decide together on the test projects, the marking criteria and the dimensional tolerances and will prepare the marking list.

7.2 MARKS:

Perfect	=	10 points
Very good	=	9 points
Good	=	8 points
Rather good	=	7points
Sufficient	=	6 points
Medium	=	5 points
Weak	=	4 points
Insufficient	=	3 points
Very bad	=	2 points
Zero	=	1 point

7.3 RATING

Section	Item	Maximum Points
A	Theory	10
B	Drawing	10
C	Prototype	22
D	Fault Finding	22
E	Measurement	22
F	Assembly Project	15
G	Programming	10
H		

Points will also be awarded for creativity, innovation, speed etc. (This will be developed by the judges depending on the nature of the test project).

8. COMPETITION PROCEDURE

7.3.1 The competition will be worked on all two days of the competition. Modules will be completed on each day for all competitors so that progressive marking can take place, and for results to be made available each day.

7.3.2 Competitors will have time made available to familiarise themselves with material and processes. Where processes are particularly difficult, the judges will provide a subject matter expert to demonstrate the process and the competitors will be given the opportunity to practice.

7.3.3 The competitors will be given all competition documents including the marking criteria prior to the commencement of the competition so that they may study the requirements.

7.3.4 Prior to the start of the competition, each competitor will receive a detailed timetable reflecting the timing for completion of modules.

7.3.5 Project Design, Selection and Documentation will be carried out as specified.

PCB information is provided in Appendix 6

8.6 The rules and procedures, and timetable specified in Appendix 2, 3 and 4 must be complied with.

9. JUDGING PROCEDURAL REQUIREMENTS

9.1 The experts that attend the competition will be divided into marking groups to deal with each section of the marking criteria.

9.2 Every completed module will be marked on the same day in which it was completed.

10. GENERAL SAFETY REQUIREMENTS

10.1 All competitors must use safety glasses when using any hand, power or machine tools or equipment likely to cause or create chips or fragments that may injure the eyes

10.2 All competitors must wear appropriate clothing.

10.3 All machinery, equipment and safety clothing must comply with the safety rules as specified.

10.4 Competitors must keep their workspace clear of obstacles and the floor space clean of material and equipment - any items likely to cause the competitor to trip, slip or fall.

10.5 Failure by the competitor to comply with safety directions or instructions may incur penalties for safety.

10.6 Judges will wear the appropriate personal safety equipment when inspecting, checking or otherwise working with a competitor’s project.

10.7 Safety Checklist must be adhered to and is provided in Appendix 5

11. APPENDIX 1

Project Documentation

Project documentation must be brought to the competition on 3.5" floppy disc format,/CD in Microsoft Word. Where experts have used drawing software. Experts should bring along the version of the drawing program software that they used. Paper copies should also be presented. Where possible circuit diagrams will be used for all modules and project wording should be as brief as possible. All projects must include the following:-

1. Short project brief
2. Parts list
3. Circuit diagram
4. Data sheet pack
5. Projects will only be accepted with software

12. APPENDIX 2

Competition Rules for Competitors while working on their Projects

1. If you have a question raise your hand.

2. You must not leave your workstation without permission, except to obtain wire etc from centre bench.

3. If you feel ill or require anything, raise your hand.

4. You may not leave the stand without an escort except at scheduled times for lunch and visits to other stands.

5. You must not touch any project other than your own.

6. You may not touch any other competitors' equipment.

7. If you finish and leave your stand early, you **must** leave the stand.

8. No use of mobile phones is permitted.

9. No talking to any people outside the stand area while you are working on a project.

13. APPENDIX 3

Suggested Competition Timetable - Skill ___ Industrial Electronics

Day 1

Step	Activity	Start Time	Finish Time
1	Introduction by Chief Judge	09.00	09.15
2	Demonstration of assembly rack and power supplies	09.15	09.45
3	Start assembly	10.00	12.00
4	Lunch	12.00	2.00
5	Continue with assembly of project	2.00	4.00
Total Competition Time			**6.00**

Day 2

Step	Activity	Start Time	Finish Time
1	Drawing Introduction	09.00	09.30
2	Drawing/C programming	09.30	10.30
3	Tour around venue and lunch	10.30	11.00
4	Theory Introduction	11.45	1.00
5	Theory	1.00	2.00
6	Break	2.00	3.15
7	Demonstration of Fault Finding one project	3.15	3.30
8	Fault Finding One	3.30	4.30
Total Competition Time			**6.00**

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Step	Activity	Start Time	Finish Time
1	Introduction to Design Project	09.00	09.30
2	Design and Prototype	09.30	10.30
3	Lunch	10.30	12.00
4	Demonstration of Fault Finding Project number 2	12.00	2.15
5	Fault Finding	2.15	3.15
6	Tour around Venue	3.15	5.00
Total Competition Time			**5.00**

Step	Activity	Start Time	Finish Time
1	Demonstration of Measurement and Testing Project	09.00	09.15
2	Measurement Project	09.15	12.15
3	Lunch	12.15	1.30
4	Demonstration of C Programming Project	1.30	2.00
5	C Programming Project	2.00	4.00
Total Competition Time			**5.00**

14. APPENDIX 4

FAIRNESS

As part of the competition, each competitor is required to have a fairness of competition rules for the experts, which are listed below for your comments.

Before the competition starts

1. All experts are to be trusted
2. Experts to believe in each other and their values
3. Effective management of time
4. Communicate both accurate and complete
5. Keep communication with team members user-friendly
6. Be a good listener
7. As a team we value the contributions of its members

4.1.1. Reach early agreement and our goals and have contingency plans

1. Create a vision of success for other competitions to follow

2. We will not make preformed judgments

3. Recognise issues early and open dialogue then explore for common ground

4. If you have a visitor to the stand he/she must not speak to the competitors
5. Be united in our decisions

6. Always show a united front when dealing with the competitors

4.1.2. When the competitors arrive

1. You must not leave the stand when your competitor is away from the stand unless in the presence of another expert

2. No use of mobile phones is permitted.

15. APPENDIX 5

Health and Safety Check List

List each item A to C

'A' = Satisfactory
'B' = Unsatisfactory but rectified immediately
'C' = Unsatisfactory - remedial action required

1. Are all exits from the area free of obstruction?

2. Are all gangways within the area free from obstruction?

3. Are all fire fighting appliances at their designated, location, and access to them not obstructed?

4. Do Experts / Competitors in the area know:

    a. Means of escape in emergency.

    b. The location of fire equipment and alarm points.

    c. What action to take if the evacuation alarms sounds.

    d. The action to take if a person is seriously ill / injured.

5. Is the floor surface safe?

6. Are items of furniture in a sound condition e.g. lockers, tables, chairs, benches etc.
7. Are cables and extension leads on electrical equipment, at the plug?
8. Are electrical wall sockets secure and in good condition?

9. Are the following satisfactory?

    a. Lighting
    b. Ventilation
    c. Temperature
    d. Noise level
    e. Extraction

10. Are "fittings" in a safe state, e.g. lights, service supplies etc.

11. Are all items of handling equipment in a safe condition, e.g. trolleys etc. and up to date. (In the area)?

12. Are all filing cabinet drawers functioning correctly, and are drawers prevented from coming out by limit stops.

13. Are metal cabinets free from sharp edges?

14. Are the tops of units free from unsuitable objects?

15. Is there suitable storage provided (and used) for cabinet drawer locking bars, when not in use.

16. If applicable, are paper guillotines properly guarded?

17. Does the area demonstrate a satisfactory level of decent housekeeping? e.g. steps, ladders etc. (are they in good condition)?
18. Are heavy items stored on low-level racks?

19. Are all personnel trained to use appropriate equipment in this area (see supervision)?

20. Are there necessary restrictions being enforced e.g. entry of unauthorized persons.

21. Are flammable liquids and chemicals stored in appropriate environment correctly, e.g. gloves, goggles etc?

22. Are the edges of areas marked with a hazard stripe?

23. Are all equipment that require guarding, fitted with secure are serviceable guards?

24. Is eye protection being worn in appropriate areas?

25. Are there other items of safety equipment available for use?

26. Are tools in good condition?

27. Are all raw materials or equipment safely positioned?

28. Is there a list of authorised persons who may use machines or equipment?

29. Are waste materials correctly disposed of?

30. If chemicals or substances are used, are they in suitable containers that are correctly marked?

31. Is safety information for chemicals or substances used available and known to the user?

32. Are the emergency stop buttons on equipment assessable and clearly marked?

33. Are competitors supervised?
34. Are freestanding gas bottles secured?

35. Are all tools in use in good condition?

36. Are free standing gas bottles secure.

37. If applicable, have all system components been subjected to test, is a certificate available?

38. If applicable, is equipment within validation.

39. If applicable, is pipe work adequately secured?

40. Are there written procedures for: -

a) Setting up for test.
b) Test procedure.
c) Making safe after test.

41. Are the necessary restrictions being enforced e.g. entry of unauthorized personnel.

42. Do all personnel know the main isolation controls of the services being used?

43. Are cables and flexible hoses correctly routed to prevent accidents or damage?

44. If flammable liquids or chemicals are being use, are they: -

a. Of minimal quantity.
b. In approved containers.
c. Correctly labelled.

45. Have reasonable safety precautions been taken against any foreseeable occurrence whilst carrying out the test.

46. If applicable, is the equipment correctly bonded / earthed.

47. If competitors or others are working in the area, are they under full supervision.

16. APPENDIX 6

Specifications for PCB cards

Mechanical spec.'s

The Europe format for PCB card is specified as follow (PCB only):

All Dimensions are in millimeters. Tc ***= 160 mm***

The Europe format for PCB card with a front plate
Is specified as follow (with front plate and DIN41612 connector):

All Dimensions are in millimeters. ***Tc = 160 mm***

Front Plate dimensions (if needed): 40,64 mm x 128,7 mm x 2,5 mm

PCB connector

Each card must be designed with a DIN41612 male 64 pins a + c (C form) connector for PCB. The reference from HARTING is: 0903.164.6921.

Mechanical dimensions of the connector