2014WRO 世界賽設備規定暨注意事項

競賽國小、國中、高中組:

1.1. 機器人的控制器,馬達以及感測器都必須是 LEGO® MINDSTORMS™系列(RCX,NXT,或者 EV3)以及 HiTechnic Color Sensor。機器人其餘的組裝零件也可以使用 LEGO®品牌產品

WRO 建議隊伍使用教育版的設備才能自 LEGO EDUCATION 當地推廣中心獲得更多的售後服務。

1.2. 參賽隊伍必須自行準備比賽會用到的設備、軟體和電腦。

1.3. 參賽隊伍於進場時必須自行斟酌所需的備用零件或器材,以防止可能發生的意外。若參賽隊伍所攜帶之設備發生故障,主辦單位不會負責維修或更換。

1.4. 比賽期間教練不得以任何方式對選手做任何諮詢或指導,唯組裝測試計時開始前,選手可透過工作人員向場外教練尋求協助。計時開始後選手除場地因素可向工作人員求助外,必須自行排除機器人或設備相關問題。

1.5. 比賽開始時,所有的機器人都必須是零件的狀態,不得有任何已組裝之零件,包括輪胎輪框、鏈條、電池…等。

1.6. 也不能攜帶說明書、機器人組裝圖片或文字(不論形式)。

1.7. 選手可以事先準備好程式。

1.8. 機器人不可使用螺絲、黏著劑或膠帶等物品來固定,違者將被取消比賽資格。

1.9. 程式軟體須為 ROBOLAB™ , LEGO® MINDSTORMS™ NXT 或者 LEGO® MINDSTORMS™ EV3 SOFTWARE。

	Robolab	NXT Software	RobotC	EV3 Software	Labview*
RCX	∨	÷	÷	÷	÷
NXT	∨	∨	÷	∨	∨
EV3	÷	÷	÷	∨	∨

*Labview for LEGO MINDSTORMS 僅能在高中競賽組使用

1.10. 機器人使用零件、馬達和感應器都必須是 LEGO®及 HiTechnic(下表),其餘公司產品將不被允許。參賽選手不得對零件(例如:EV3,RCX,NXT 馬達,以及感應器等)做任何改裝,違者將被取消比賽資格。

注意:WRO 2014 競賽組不能使用 EV3 Gyro Sensor。若是參賽隊伍使用 EV3,僅能使用三組馬達接頭。

5225		RCX 馬達
9758		RCX 光源感應器
9889		RCX 溫度感應器(9V)
9891		RCX 角度感應器(9V)
9911		觸控感應器
9842		NXT 伺服馬達
9843		NXT 觸控感應器
9844		NXT 光源感應器
9845		NXT 聲音感應器
9846		NXT 超音波感應器
9694		NXT 顏色感應器
45502		EV3大型馬達
45503		EV3中型馬達
44504		EV3超音波感應器
44506		EV3顏色感應器

44507		EV3觸控感應器
44509		EV3紅外線感應器
		HiTechnic NXT Color Sensor V2

1.11.　參賽隊伍不能攜帶比賽底圖、底板、道具、乾電池、NXT 或 EV3 之鋰電池充電器進入會場，違者可能會被取消比賽資格。

1.12.　參賽隊伍最多可攜帶 LEGO® MINDSTORMS™ Education NXT 之 9798 或 9693 或 EV3-45501 鋰電池 3 顆。比賽期間（包括組裝及測試）機器人只可以使用大會所提供的電池（每隊六顆三號）或自備的 LEGO® MINDSTORMS™ Education NXT 或 EV3 鋰電池來完成比賽和練習。

1.13.　LEGO®現成的迴力、發條馬達或氣動元件仍是不開放使用的。

足球賽:

- 機器人只能使用 LEGO 的零組件、馬達和感應器。
- LEGO 零組件不得以任何形式修改。
- 僅能使用 LEGO MINDSTORMS 的控制器、馬達和感應器(但 Gyro sensor 不可使用)及 HiTechnic NXT IRSeeker V2 sensor 和 HiTechnic NXT Compass sensor。
- 其它建構機器人的原料都被禁止，包括膠水、膠帶和螺絲…等。
- 非 LEGO 的羅盤感測器及紅外線感測器為唯一可使用的市售零件。
- 不得使用全向輪(omni directional wheel)。
- 束線帶與膠布可用於固定線材。
- 機器人程式僅可使用 LEGO Robolab, LEGO Mindstorms NXT-G, LEGO Mindstorms EV3。任何 C 或與其相關的程式將不被允許採用。
- 不保證比賽時的光源讓使用 Robolab 搭配 HiTechnic IR V2 感應器的機器人能正常運作。
- 在訂定這些規則時，HiTechnic 的元件和 EV3 軟體並不相容。使用 EV3 軟體和元件的機器人也有其風險。

競賽大專組:

The only parts and materials allowed in the construction the Robot are listed below. No other parts and materials are permitted.

4.1. Any part from the LEGO®, MATRIX™ or TETRIX™ system with the following constraints:

　　4.1.1.　No more than eight (8) DC drive Motors.

　　4.1.2.　No more than eight (8) Servos.

　　4.1.3.　No more than two (2) Rechargeable Battery Packs, which are identical to those supplied in the kit of parts.

　　4.1.4.　You may modify metal parts to any size.

4.2. Any LEGO building element with the following constraints:

4.2.1. Exactly one (1) NXT/EV3 Brick may be used as controller.

4.2.2. The NXT/EV3 controller must be powered either by the NXT rechargeable AC battery, NXT DC Battery, EV3 DC Battery or six (6) AA (rechargeable) batteries.

4.2.3. LEGO Motors may be used with the following constraints (per NXT/EV3 motor port, and the 4th motor port is not allowed with EV3):

> One (1) EV3 Large Servo Motor
>
> One (1) EV3 Medium Motor
>
> One (1) NXT Interactive Servo Motor
>
> One (1) XL Power Function Motor
>
> Two (2) E Power Function Motors
>
> Two (2) M Power Function Motors
>
> One (1) E Motor and one (1) M Motor
>
> You are allowed to use any number of NXT conversion cables to connect the Power Function Motors with the NXT or EV3 Brick
>
> You are NOT allowed to use any of the Power Function Battery Packs

4.2.4. LEGO pneumatic elements are allowed. Teams may not modify LEGO pneumatic elements or attempt to change the working pressure limits of the elements.

4.2.5. Any LEGO certified NXT/EV3 sensor (as indicated by the LEGO MINDSTORMS Certified – Hardware label) is allowed.

4.2.6. Any NXT/EV3 compatible sensor from HiTechnic, including the NXT Touch Sensor Multiplexer, NXT Sensor Multiplexer and the NXT prototype boards (both solderable and solderless) is allowed.

4.2.7. The HiTechnic 9-volt Battery Box that is sold as part of the NXT Sensor Multiplexer set may be used in conjunction with each NXT Multiplexer (i.e. one Battery Box per Sensor Multiplexer). It may be used only in conjunction with and to power the NXT Sensor Multiplexer(s).

4.2.9. The HiTechnic 9-volt Battery Box that is sold as part of the NXT Sensor Multiplexer set may be used in conjunction with each NXT Multiplexer (i.e. one Battery Box per Sensor Multiplexer). It may be used only in conjunction with and to power the NXT Sensor Multiplexer(s).

4.2.10. Custom NXT/EV3 extension cables are allowed, as long as it looks like approved one.

4.2.11. Non-NXT/EV3 electrical elements not specified above are not allowed, with the exception of RCX sensors.

4.2.12. LEGO Duplo products are not allowed.

4.2.13. At the time of writing these rules the compatibility of TETRIX/MATRIX and EV3 controller was inconsistent. Teams use EV3 and/or its components at their own risk

4.3. Plastic-coated wire rope with a bare wire diameter of 0.03125" (0.08cm) or smaller. Compatible compression sleeves, clamps and hardware may also be used only in conjunction with the plastic-coated wire rope.

4.4. All mechanical fasteners (nuts, bolts, screws, etc.) of any length, any thread type, up to 3.5. 0.375" (0.9525cm) diameter. The intent of this rule is to allow teams to use fasteners from any supplier that are substantially the same as MATRIX/TETRIX fasteners. Compatible fasteners are characterized by using the same thread characteristics as MATRIX/TETRIX fasteners. For example, for MATRIX standard metric (M3, M4) screws are an acceptable substitute. For TETRIX 6-32 thread, 1/2" length socket head cap screw is a 6-32 thread, 3/4" length, button head cap screw purchased at a local hardware store. Any other non-metal parts are allowed with maximum thickness 0.2cm.

4.5. No additional components may be used, however functionless components used only for decoration and are easily removable as wanted are allowed.

4.6. Teams should prepare and bring all the equipment, software and portable computers they need during the tournament.

4.7.   Contestants may write their program beforehand.

4.8.   Control software must be either NXT® Software, EV3 Software or LabVIEW (any version). SD card is not allowed on EV3 robot.