robotex International

MEGA SUMO RULES

COMPETITION COORDINATOR

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Contents

1 Introduction

This documentdefines the rules for the robots of Mega Sumo. The rules are based on the Baltic Robot Sumo Rules. Robotex National Mega sumo is certified by the All Japan Robot-Sumo Tournament.

2 Robot classes

Onlyautonomous robots are represented at the Sumo competition of Robotex in the following classes:

1. Mega Sumo

3 The Competition

3.1 Definition

One operator and up to four assistants may be registered for each robot (maximum of 5 team members in total). However, only the operator is allowed to handle the robot.

**The team may change the designated operator in accordance with the competition rules*

However, only the operator is allowed to handle the robot. All contestants must follow the competition rules, the terms and conditions of winning and participate using only self- made autonomous robots at the Dohyo area designated beforehand. The winner is announced by the referees.

3.2 Format

The competition format is established by the tournament organisers, depending on the number of participants. If the number of participants is high, sub-groups will be used in order to decide who enters the final tournament. The finals are held in the format of double-elimination tournament. If the number of participants is low, all contestants will immediately compete in the format of final tournament.

3.3 Sub-classes

Robotex Mega Sumo competitions take place in single age group.

3.4 Technical Inspection and registration

The robot needs to pass technical inspection before the competition. The robot technical inspection is based on paragraphs “5.” and “7.”. During the inspection, it is checked whether the robot or the operator who is handling the robot meets the paragraphs requirements. Only one team member with a robot *(the currently selected robot operator)* can come to the technical inspection. If necessary, they can have a

translator or team instructor with them. The purpose of this is to guarantee a smooth course of the competition and technical inspection.

4 Dohyo Jyonai

Dohyo Jyonai (the match ring area) consists of the Dohyo (the match circle) and the Yochi (the outer layer area of Dohyo). The rest of the space will be deemed as area Dohyo Jyogai (outside the Dohyo area). The area of Dohyo Jyogai is surrounded by guards (see Appendix 1. Figure of match area).

The Dohyo (the match circle) is a circle that is that is covered with a black color coating.

Table 1 Parameters of the Sumo fields

Class	Height	Diameter	Court material
Mega Sumo	5 cm	154 cm	steel

4.1 Starting cross

The starting cross is placed in the middle of the Sumo field and it divides the field into four equal sectors. The robots must always be located in two reciprocal sectors (see Figure 1). The robot must cover the area of Tawara (white line) at least partially. The referee removes the starting cross from the field once the robots have been placed.

The robot cannot be moved after it has been placed on the field.

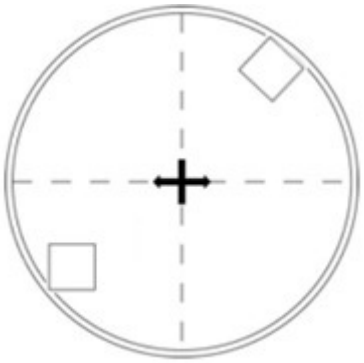

Figure 1 Starting cross

4.2 Tawara (white line).

Tawara is the white line around the Dohyo. Tawara line is a part of the Dohyo.

Table 2 Dimensions of Tawara by competition classes

Class	Width of Tawara
Mega Sumo	5 cm

4.3 Yochi

Yochi is an area around the Dohyo with a diameter of at least 250 cm for Mega Sumo competition. Yochi colour and material can be freely chosen from all colours besides white.

4.4 Lighting conditions

Thelighting inthe areaneeds to be as close to real sunlight as possible (Midday), with consistent color and stability. The Dohyo cannot have shadows while the round is running. Lighting is allowed to change between matches, but it needs to be consistent for every round. Each Dohyo at the competition area must be evenly lit.

5 The Robot

5.1 Requirements for the robot

5.1.1 Dimension and weight restrictions

Table 3 Dimension and weight restrictions

Class	Mass	Length*	Width *	Height
Mega Sumo	3 kg	20 cm	20 cm	unlimited

* NB! Start Module must be placed on top of the robot on the highest point of the robot, not on the side or under the robot.

* NB! Mega Sumo robot measure box is 20 x 20 cm with +2 mm tolerance.

* The robot may expand after the start of the round but must stay in one piece.

5.1.2 Autonomous robots – starting the movements

Table 4 Starting the movements

Class	Starting method
Mega Sumo	Official infrared remote control operated by the referee. See the technical specification of the compulsory receiving device from Appendix 2. Start and stop remote control system.

5.1.3 Autonomous robots – stopping the movements

Table 5 Stopping the movements

Class	Stopping method
Mega Sumo	The referee stops the robots by using official infrared remote control. See the technical specification of the compulsory receiving device from Appendix 2. Start and stop remote control system. Additionally, the operators of the robot can use their remote controls to stop the robot.

5.1.4 Requirements for blade use

- It is not forbidden to use double blades.
- It is forbidden to use any components that may separate from the robot when it moves or comes into contact with another robot.

- For Mega Sumo robots, all edges, including but not limited to the front scoop, must not be sharp enough to damage the Dohyo (exception is when the robots collide), other robots, or players.

5.2 Movements of autonomous robots

The movements of the robot should be designed to detect the movements of the opponent and respond/attack accordingly. If there is any doubt in the autonomy of the robot, the referees have the right to inspect the control logic of the robot.

5.3 Start/Stop system requirements

The robot must have a start/stop module that works with the referee's remote. *The participants are responsible for making sure their module works correctly*. This includes ensuring it is not affected by external factors like bright lights or infrared noise (see Section 14.1: Lighting and infrared noise). Full technical details and recommended module is listed in Appendix 2.

5.4 Use of remote-control devices with autonomous robots

During the competition (round), the remote-control devices must be placed on a previously designated area. The devices may only be used to stop the robot, when the referee gives a corresponding command. The official infrared remote control device is held by the referee.

5.5 Prohibited components of the robot

1. Any components that may disturb the operation of the opponent (for example, flashlights or jamming devices such as IR LEDs intended to saturate the opponents IR sensors).
2. Any components that may damage or scratch the surface of Dohyo. An exception is when the robots collide.
3. Any components that are designed to damage the opponent.
4. It is forbidden to use any liquids, powders and gas as a weapon against the opponent.
5. It is not allowed to use any inflammable materials in the robot.
6. The robot must not include any throwing devices (for example throwing a net on opponent).
7. The robot must not include any parts, which fix it onto the Dohyo (for example, glues, suction cups, etc.). Magnets that improve the grip of the wheels are allowed.

6 Match Principles

1. The match generally contains three rounds and lasts up to three minutes. The team who will be first to earn two Yuko points (effective points) during the time of the match, will be the winner. Match time is measured during rounds, not between them.

2. If only one Yuko point has been earned by the end of the match time, the winner is the team who earned it.

3. If neither team wins any rounds during the match time, the winner will be announced according to the situation of Yusei (dominance), see paragraph 8.3. If Yusei cannot be decided or the number of rounds that has been won is the same for both teams, the match time will be extended by three minutes. If one team earns one or more Yuko points during the extended time, then this team will be the winner.

4. The contestants have a maximum of 30 seconds between the rounds to maintain their robot.

7 Organizing the competition

7.1 Safety requirements

For safety purposes, the referees and contestant must wear gloves and goggles according to the robot class.

Table 6 Safety requirements

Class	Gloves	Goggles
Mega Sumo	required	required

7.2 Starting the match

The match starts with the referee's signal. The contestants will bow to each other before they enter the area of Dohyo Jyonai.

Before each round and with the signal from thereferee, the contestants place their robots simultaneously on the Dohyo. The robots mustbe placed in reciprocal sectors and at least some part of the robot must stay on the whiteline (see Figure 1 Starting cross). The robots are not allowed to move after they have beenplaced on the Dohyo.

The round begins with a method that has beendescribed for each robot class.

Table 7 Start method

Class	Starting method
Mega Sumo	The participants leave the area of Dohyo Jyonai after they have placed their robots there. The referee starts the round by sending a start command via official infrared remote control. The robots may start moving after they have received the start command.

In case the Dohyo area is scratched or becomes dirty, the referees decide whether to continue the match on the same Dohyo or replace it.

7.3 Ending the match

1. The referee gives a signal to end the match and stop the robots. The stopping method is separately designated for each class.

Table 8 Stopping method

Class	Stopping method
Mega Sumo	The referee stops the robots by sending a stop command via official infrared remote control. Additionally, the operators of the robots can use their own methods to stop the robot.

2. The match ends officially after a corresponding signal from the referee. The participants must take their robot from the Dohyo, bow to each other and leave the area of Dohyo Jyonai.

7.4 Torinaoshi (repeat of the round)

The round is repeated in the following situations.

1. Both robots are facing each other, and their movement is hindered, or they do not move at all.
2. Both robots fall out of the Dohyo at the same time.
3. Other situations in which it is not possible to determine who has won or lost.
4. If it is not possible to announce the winner after Torinaoshi, the referee may place the robots himself or herself and continue with the match within the allocated time.

7.5 Handling the robots between the matches

For the time between the matches in the same sub-group, the robots must be placed on a table assigned for it and can only be removed from there for the duration of the match. It is forbidden to leave the competition area with the robot between the matches until the same group results have been decided and checked, except for when a corresponding permission has been given (e.g. the robot needs fixing). During the sub-group tournament, it is not allowed to modify the robot.

The purpose of this requirement is to guarantee a smooth course of the competition.

NB! If the robot cannot be found from the designated table at the right time or if the Team itself is not present; the match will result in a loss.

7.6 Delay of the competition

When competitions start to delay, organizers have the authority to act in accordance with rules to minimize the delays and bring the competition back on schedule.
The competition will continue as smoothly as possible, eliminating any rematches or any moments that could cause delays, and instead use a less time-consuming judging system based on rules. Any objections will not be accepted during the delay, and competition will not be delayed resolving the objections. If the robot cannot be found in the designated area, the match will result in a loss.

8 Yuko (effective) point, Shinitai and Yusei (dominance)

8.1 Yuko (effective) point

The winner is announced in the following situations.

1. If the opponent has been pushed out of the Dohyo (the robot touches the area outside of the Dohyo).
2. If the opponent falls out of the Dohyo and touches the area outside of the Dohyo.
3. In the situation of “Shinitai”.
4. In the situation of “Yusei (dominance)”.
5. If “Keikoku (warning)” is given twice to the opponent.
6. If there is a case of “Hansoku (violation)”.
7. If the winner is announced without a match, the winner earns two Yuko points (if the winner already has one Yuko point, he or she earns only one more). The existing Yuko point(s) of the opponent who lost remain effective.

8.2 Shinitai

“Shintai” situation means that one or several wheels of the robot roll out of the Dohyo and the robot is unable to return to the Dohyo. In this case, the opponent earns one Yuko point.

8.3 Yusei (dominance)

In a situation of “Yusei” (dominance), the referee may grant a Yuko point to the team according to the strategy, movements and skills of the robot.

9 Hansoku (violation) and penalty

9.1 Keikoku (warning)

Acontestant whoactsas indicated below gets a “Keikoku” (warning). If the contestant gets two Keikokus (warnings), the opponent earns one Yuko point.

1. If the operator or some item of the operator (for example, remote control) ends up in the area of Dohyo Jyonai before the round ending signal of the referee.
2. If the robot moves before the beginning of the round (movement or changing its shape).
3. If the participant violates the requirements for the use of remote control.
4. If the robot is replaced after it is placed on the Dohyo.
5. If the participant does not comply with the safety requirements.
6. In case of any other action that is considered unfair.
7. If the robot fails to initiate movement upon receiving the start command from the referee's remote control.

9.2 Hansoku (violation)

Inthefollowing situations the opponent or both parties earn one Yuko point.

1. If some parts, with total weight of more than 5 grams fall off from the robot.
2. If the robot does not move.
3. If both robots move, but do not collide.
4. If the robot is on fire or a situation, which resembles that the robot is on fire.
5. If the participant wants to end the round.

9.3 Hansokumake (defeat due to violation)

Theparticipantwhoviolates the following rules, loses the match due to violation.

1. If the contestant fails to show up at the designated Dohyo at the beginning of the match or the participant exceeds the time given for maintenance, see paragraph 6 Match Principles.
2. If the contestant sabotages the match. For example, by deliberately breaking or deforming the Dohyo.
3. If the participant violates the requirements provided for “The Robot” in paragraph 5. If the robot does not make autonomous movements.
4. If the participant does not comply with the requirements provided in paragraph 7.1 Safety requirements, even after paragraph 9.1 “Keikoku” (warning).

9.4 Sikkaku (disqualification)

Inthefollowing cases, theparticipant will be disqualified – he or she must leave the competition and is not added to the list of competition results.

1. If the participant’s robot does not comply with the requirements provided in paragraph 5. The Robot.
2. If the participant behaves in an undignified manner. For example, swears or offends the opponent or the referees.
3. If the participant deliberately injures the opponent.

10 Suspending the match

1. If the participant is injured and the match cannot be continued, the participant may demand the suspension of the match.
2. In the event of the previously described situation, the referees make necessary arrangements for the match to be immediately resumed.
3. If the arrangements do not enable the match to continue, the opponent wins the competition without a match.

11 Objections

Thedecisionsofthe referees are not subject to appeals. Complaints must be submitted during or immediately after the match. If no settlement is reached with the referee, claims must be submitted immediately to the Robotex Head referee. Any later complaints will not be accepted. In case of any conflicts or disputes, the final word will be said by the referees and/or the organisers. NB! Rude behaviour is not tolerated and the team who does not respect the referee's / head referee's decisions can be disqualified by the head referee and/or event organisers.

12 Marking the robots

12.1 Markings on the robot

The robots must be marked with number stickers (robot number). The stickers are provided by the organisers of the competition. The sticker cannot be placed on the plow of the robot, or on any other component, where it may disturb the work of opponent's sensors.

13 Changes and cancellations in the rules

Changesand cancellationsmadetothe rules areadopted by the main organizer of the competition according to theregulation of the regulatory committee of the competition.

14 Organizing

14.1 Lighting and infrared noise

The arena has at parts uneven lighting and infrared noise, which may disrupt the work of sensors during the competition. For this reason, the organizers recommend using covers or blinds for sensors, testing the sensors under intense lighting conditions or even under direct sunlight to imitate the lighting conditions of the competition arena.

14.2 Winners one-year break

Winners of 1st place cannot compete in the same category next year– they must take a one-year break from that category. At least 50% of the team must consist of non-winners. If the winners' team has three members, next year they should have at least one new member who was not previously on this team to compete in the same category again instead of taking a year off from it. This rule is aimed at bringing new people, giving everyone a fair chance and encouraging recurring winners to try new competitions they usually do not participate in and to educate and engage new beginners in the field of robotics. *

*** The rule complies only with Robotex International standards and is used for Robotex National competition.**

15 COMPETITION FLOW – Main Flow

* The flow complies with Robotex International standards and is used for Robotex International competition. To meet the standards, the organizer or Robotex National organizer can modify the competition flow either on the day of the competition or for each event separately.

1. TECHNICAL INSPECTION

The time for technical inspection is stated on the event timetable. Competitors need to pass technical inspection during that time slot to compete. Only one team member (With a translator or instructor if in need) can come and complete the technical inspection. To identify your team, it's necessary to know both the name of your team and the name of your robot at the beginning of the technical inspection. *(If your team name or robot name contains special characters or many numbers or your name can be identical to others' robot names, then write it down on paper and show it at the technical inspection for better flow and understanding)* Your team will have time to make your robot meet the competition requirements if it does not meet the technical requirements first time, but you need to pass and obtain the Robotex robot number sticker on the robot before the technical inspection closes.

2. SUB-GROUP STAGE –

First selection process, where registered competitors who passed technical inspection are drawn into sub-groups. When your group starts, you need to be found near the competition area, you will be called out to enter the competition area. (It's important to keep in mind that your group can either delay or start earlier than the timetable has indicated.) Robots need to collect the most points (Wins) in your group, top 1 to top 3 competitors (The number of robots allowed into the semi-finals from the sub-group stages will be decided by the organizers at the beginning of competition day.) with most points will pass to semi-finals.

During matches in the same sub-group the robot cannot leave the competition area until the same group results have been decided and checked. (The team can switch robot operators during the waiting time, but always one operator needs to be found near the robot. Only one team member can be in the competition area - this is the robot operator.) In the event of any draws among the robots in the same group (which interferes with the decision of the group or the final winner), rematches will be conducted between the named robots to determine clear winners for the sub-group. The referee will give permission to leave the area after the results are checked and inserted into the system. (If there are not enough participants in this category, the Sub-Group Stage will be skipped, and the competition will start straight from the semi-final stage.)

3. SEMI-FINAL STAGE- Second selection process, held in tournament format with losers'brackets. At thebeginning of the semi-final, your robot will be called out and the robot with the operator will need to enter the competition area. If the organizers decide to conduct another technical inspection for all semi-final robots, they will inform the competitors. The robot needs to be found in the designated area during the semi-final stage with a single operator. *(The team can switch robot operators during the waiting time, but always one operator needs to be found near the robot. Only one team member can be in the competition area - this is the robot operator.)* The robot and operator are allowed to leave the area if they lose 2 matches or if the Referee/Organizer authorizes it. (Paragraph 7.5)

4. GRAND-FINAL STAGE- The final selection process, usually held on the eventmainstage.At the beginning of the grand-final, your robot will be called out and the robot with the operator will need to enter the competition area. If the organizers decide to conduct another technical inspection for all grand-final robots, they will inform the competitors. The robot needs to be found in the designated area during the semi-final stage with a single operator. *(The team can switch robot operators during the waiting time, but always one operator needs to be found near the robot. Only one team member can be in the competition area - this is the robot operator.)* The robot and operator are allowed to leave the area if Grand-final is finished or if the Referee/Organizer authorizes it.

16 Appendix 1. Figure of match area

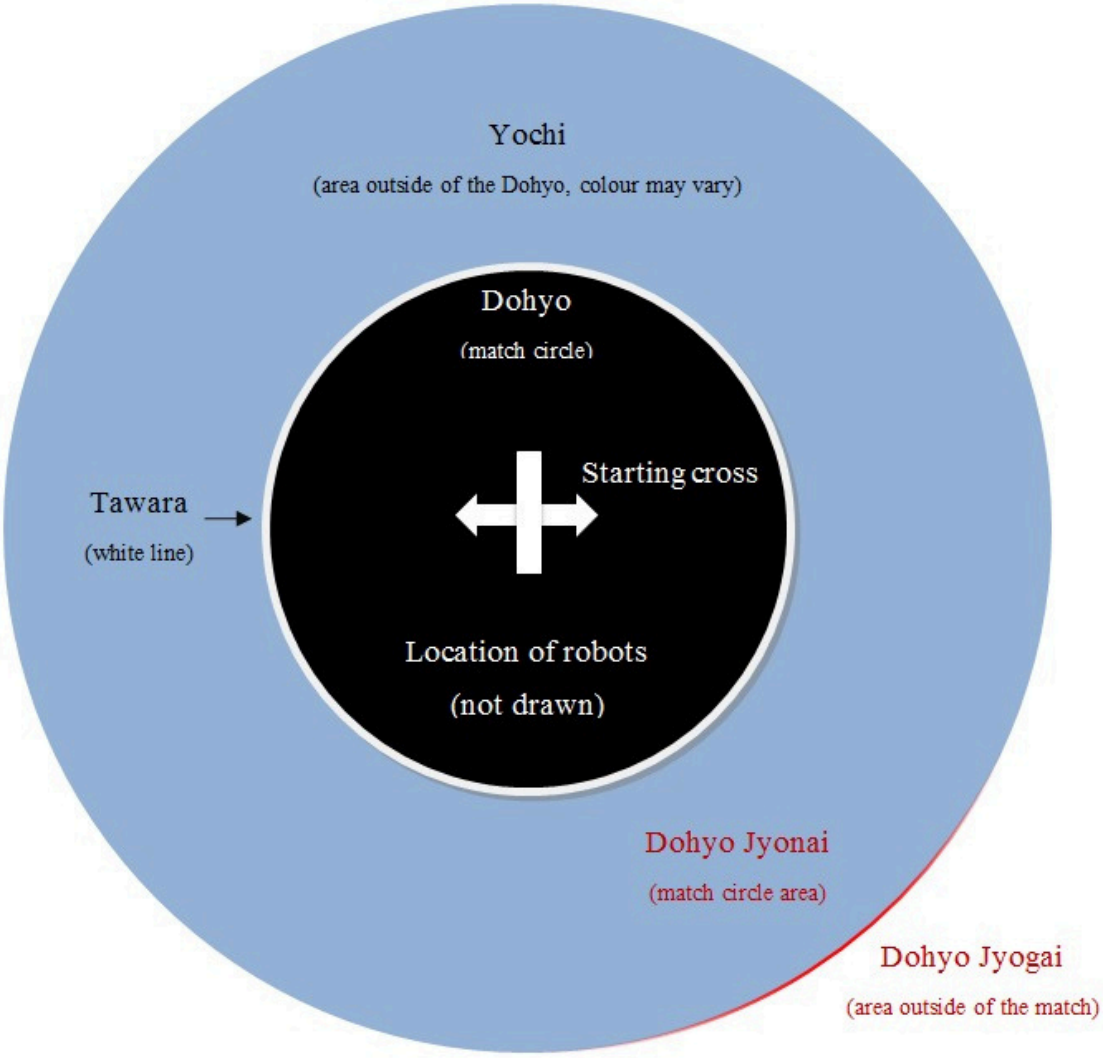

Figure 2 Match area

17 Appendix 2. Start and stop remote control system

Participants are highly recommended to use the "Nanolabs" start-stop module or an equivalent pre-certified solution to ensure full compatibility with the referee's system.

The same start and stop remote control system applies to Robotex Sumo as used in the competitions of Baltic Robot Sumo, RobotSM and RobotChallenge. The aim of the system is to ensure fair and quick start of the round. For safety purposes, the system is equipped with a stop switch. Using one and the same control system in different competitions is convenient for the participants. The system is based on the infrared transmitter, which is operated by the referee, and on infrared receivers, which are located on top of the robots.

The protocol used for the infrared transmitter is RC-5. RC-5 code is a Manchester coded bitstream modulated at 38 kHz. Message payload consists of a 5-bit address and a 6-bit command, which contains the remote commands (programming, start and stop) and Dohyo ID. Dohyo ID is used to differentiate close matches that take place at the same time. Following table lists the remote commands and their respective payload content:

Command	RC-5 message field
Programming	Address[4..0] = 0x0B, Command[5..1] = Dohyo ID
Start	Address[4..0] = 0x07, Command[5..1] = Dohyo ID, Command[0] = 1
Stop	Address[4..0] = 0x07, Command[5..1] = Dohyo ID, Command[0] = 0

The programming commands are used in order to write a new Dohyo ID in the infrared receivers of the robots immediately before the match. The infrared transmitters of the referee are equipped with separate low-power IR LED in order to ensure that only nearby robots could receive specific commands. The programmed Dohyo ID is used with a purpose to filter start and stop commands.

Start and stop commands have the same message address, however, only the first bit of the command field is used to determine the action. The infrared receivers of the robot must verify that the Dohyo ID of the message is the same as the one programmed into the robot and take corresponding action if it is the same.

The components of the infrared receiver must be placed on top of the robot in a way that the robot is able to receive the messages from any direction.

The robot or infrared receiver must be equipped with clearly visible LEDs in order to verify whether it has received the command of the infrared transmitter of the referee or not.

In case of a programming command, the LED must quickly flash twice. If the robot receives the start command, then the LED flashes constantly; if it receives the stop command, it starts to flash slowly.

Technical Resources

- Recommended Module: Nanolabs Start-Stop Module
- Implementation (Relay): How to implement Kill switch circuit using a relay
- Implementation (Optocoupler): How to implement Kill switch circuit using an optocoupler

18 Revision history

- 16.06.2024 Removed previous rule change history before 2020.
- 16.06.2024 Paragraph 11. Added disqualification option for rude behaviour.
- 16.06.2024 Paragraph 15. Appendix 2. Added new description about new Start Module.
- 16.06.2024 Paragraph 12.1. Specified marking on the robot.
- 16.06.2024 The layout and form of the document have been cleaned up.
- 29.08.2024 Added new paragraph 14. “Organizing”.
- 09.02.2026 Many changes have been made to the rules, please read the rules.
- 07.05.2026 Added paragraph 5.3 Start/Stop system requirements
- 07.05.2026 Revised paragraph 9.1
- 07.05.2026 Revised Paragraph 17. Appendix 2. with detailed specifications for the new Start Module.