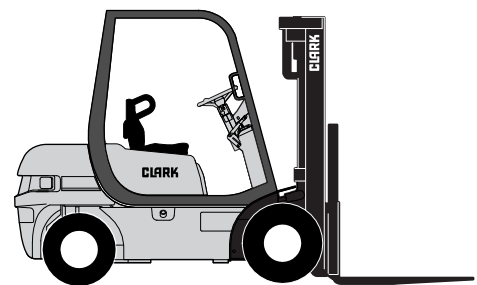


CMP15-20sD CMP15-20sL

SERVICE MANUAL

RATED CAPACITY: 1500 - 2000KG



Book No. SM-710

CLARK Material Handling
Company

GENERAL

00

- 00 – 01 REVISION HISTORY
- 00 – 02 FOREWORD
 - Foreword
 - How to read this manual
- 00 – 03 SAFETY
 - General precautions
 - Preparations for work
 - Cautions during operation
- 00 – 04 STANDARDS
 - Standard tightening torque
 - Measurement conversions

Jun. 2004

1

When new or revised information is published to update this manual the action to be taken with the pages is indicated in the table.

Pages not marked are not currently revised, but are included for page numbering continuity.

Mark	Indication	Action required
○	Page to be newly added	Add
●	Page to be replaced	Replace
()	Page to be deleted	Discard

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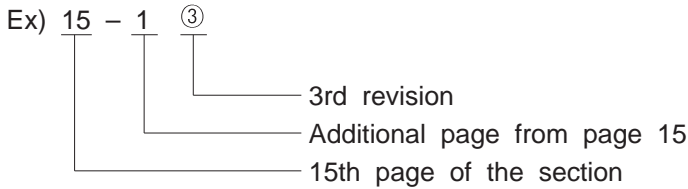
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PAGE

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Page numbering is started from each section. Therefore, revised pages can be easily inserted. Also, additional pages and revision number can be indicated.



For the revision status in this manual, refer to REVISION HISTORY.

SYMBOLS

The following symbols as defined below are used in this manual to convey the intent of the instructions concerning safety and repair.

Symbol	Item	Remarks
	Safety	Special safety precautions are necessary when performing the work.
	Caution	Special technical precautions or other precautions for preserving standards are necessary when performing the work.
	Tightening torque	Places that require special attention for the tightening torque during assembly.
	Tool	Places that require proper tools used in assembling and disassembling.
	Adhesive	Places to be applied with adhesive.
	Lubricating	Places where oil or lubricant must be added.

⚠ WARNING

SERIOUS OR FATAL INJURY MAY RESULT TO YOURSELF OR OTHERS IF NOT FOLLOWED

- This fork lift should not be operated by anyone who is not authorized and properly trained.
- Read the Operators Manual carefully, and make yourself familiar with your fork lift.
- Inspect and check your fork lift daily before and after use. Do not operate a faulty or damaged fork lift.
- Repair work should be done by authorized and trained persons only.
- To protect from falling objects, make sure that the Overhead Guard and Load Backrest are correctly mounted and in good condition.
- Before starting engine, always set forward/reverse lever in neutral, with hand brake on.
- Drive carefully, keeping forks and attachments as low as possible & fully tilted back.
- Keep a careful lookout for people, obstructions and the path of travel. Watch clearance, especially overhead and tail swing.
- Do not stick hands, feet and other parts of your body outside the Operator's compartment.
- Drive forward when you are climbing a slope with a load. Drive in reverse when you are descending with loads. Do not turn while on a slope.
- Slow down before turning. Avoid any sudden start, stop or turning. Lateral tipover can occur if the fork lift is improperly operated.
- Do not load fork lift over capacity limit designated on the load chart. Do not lift unstable loads.
- This fork lift is not designed for raising or transporting people. Do not use fork lift for those purposes under any circumstances.
- Before you get off fork lift, make sure the hand brake is set, lower forks or attachments, put forward/reverse lever in neutral position and turn off key switch. Do not park on a slope.

P/NO.6092-13130

6092-11431

GENERAL PRECAUTIONS

SAFETY PRECAUTIONS

- When carrying out any operation or maintenance, have trained and experienced personnel carry out the work.
- When carrying out any operation or maintenance, carefully read the Operation and Maintenance Manual.

Read all the precautions given on the decals which are fixed to the machine.

SAFETY DEVICE

- Make sure that all guards and covers are mounted in their proper position. Repair or replace if damaged.
- Pay attention to the method of using any safety locking device or safety belt.

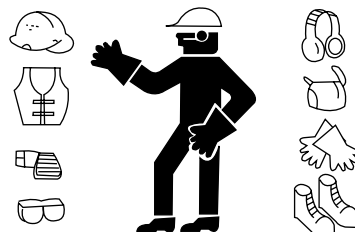
SAFETY CLOTHES AND HELMET

- Wear the specified work clothes in the correct manner.
- Use the specified protective gear (helmet, safety glasses, safety shoes, mask, gloves).

Guard against injury from flying pieces of metal or debris, wear goggles, gloves and helmet.

Always have a trained and experienced welder carry out any welding work.

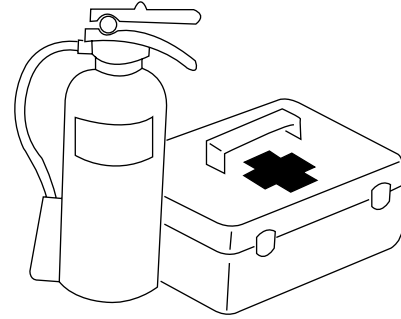
When carrying out welding work, always wear welding gloves, apron, glasses, cap and other clothes suitable for welding work.



EX048

PREPARE FOR EMERGENCIES

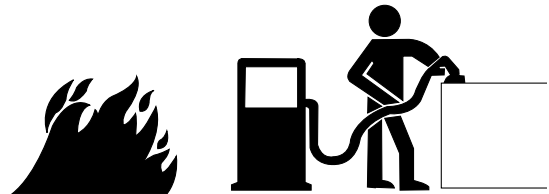
- Know where fire extinguishers are located and how to use them.
- Keep a first aid kit and an eye wash kit near the work area.
- Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.



EX036

HANDLE FLUIDS SAFELY—AVOID FIRES

- Handle fuel with care it is highly flammable.
- Do not refuel the machine while smoking or when near open flame or sparks. Always stop the engine before refueling machine. Fill the fuel tank outdoors.
- Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.



EX028



DISPOSE OF FLUIDS PROPERLY

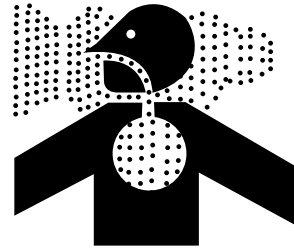
- Improperly disposing of fluids can harm the environment and ecology. Before draining any fluids, find out the proper way to dispose of waste from your local environmental agency.
- Catch draining fuel, oil, or other fluids in suitable containers. Do not use food or beverage containers that may mislead someone into drinking from them. Wipe up spills at once.
- Do not pour oil into the ground, down a drain, or into a stream, pond, or lake. Observe relevant environmental protection regulations when disposing of oil, fuel, coolant, brake fluid, filters, batteries, and other harmful waste.



EX043

AVOID HARMFUL ASBESTOS DUST

- Avoid breathing dust that may be generated when handling components containing asbestos fibers. Inhaled asbestos fibers may cause lung cancer.

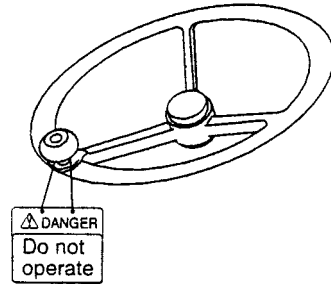


EX025

PREPARATIONS FOR WORK

WARN OTHERS OF SERVICE WORK

- Unexpected machine movement can cause serious injury.
- Before performing any work on the machine, attach a "Do Not Operate" tag to the steering wheel or the right control lever.
- When carrying out any operation with two or more workers, always agree on the operating procedure before starting.

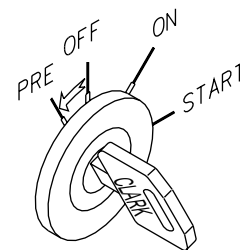


USE TOOLS PROPERLY

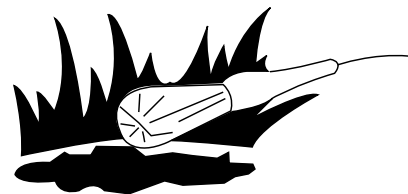
- Use a tool only for its designed application.
- Keep all tools in good condition and know the correct way to use them.
- Decide on a place in the repair workshop to keep tools and removed parts.
- Always keep the work area clean and make sure that there is no dirt or oil on the floor.
- Before adding oil or making any repairs, park the machine on hard, level ground and put blocks under the wheels or tracks to prevent the machine from moving.
- Before starting work, lower the forks or any other work equipment to the ground.
- Turn the engine OFF, remove the start key, and apply the parking brake.



EX033



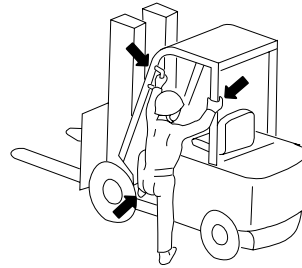
- Illuminate your work area adequately but safely. Use a portable safety light for working inside or under the machine. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.



EX042

USE HANDHOLDS AND STEPS

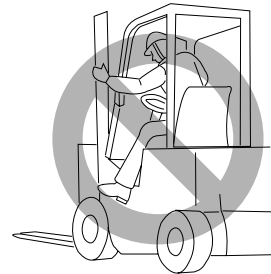
- Do not jump onto or down from the fork lift.
- When getting on or off the fork lift, use the step provided.
- Do not grasp an operating lever or steering wheel when getting on or off.
- Always keep the step clean and repair it if damaged.
- Never operate with wet or oily hands and feet.



FX019

OPERATE FROM THE OPERATOR'S SEAT

- Do not operate the fork lift from any place other than the designated operator's position.
- Improper seating may cause serious injury.

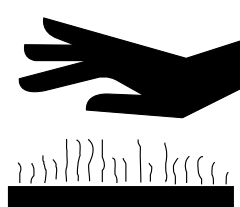


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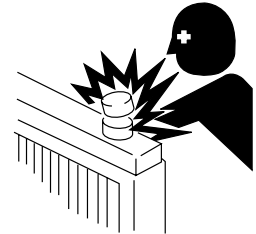
CAUTIONS DURING OPERATION

SERVICE COOLING SYSTEM SAFELY

- Hot coolant can burn you. Let it cool down.
- Turn the radiator cap slowly to release pressure. Do not remove cap if engine is overheated.



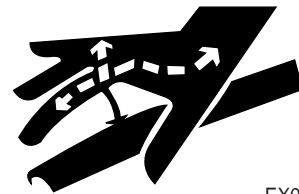
EX039



EX029

AVOID HIGH-PRESSURE FLUIDS

- Escaping fluid under pressure can penetrate the skin causing serious injury.
- Avoid the hazard by releasing pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.
- Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.
- Be careful not to break, twist or damage the high pressure pipes. A jet spray of high pressure oil may cause electrical fires.



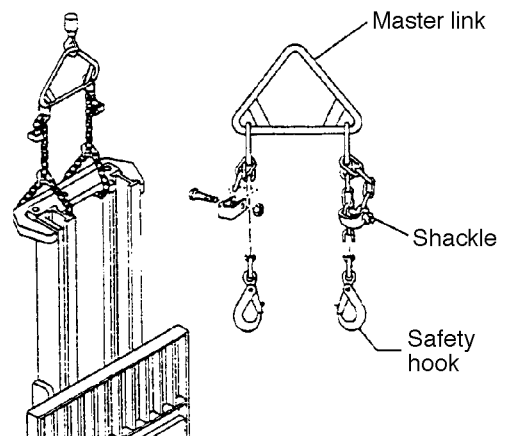
EX062



EX040

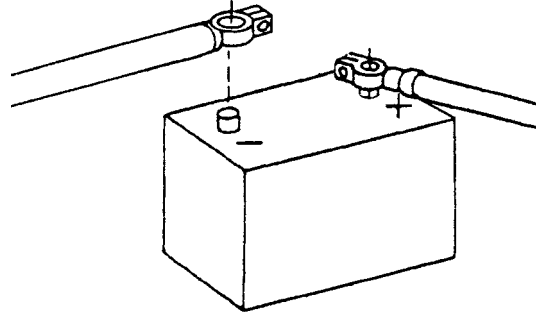
HANDLING OF HEAVY OBJECTS

- When raising heavy components, use a hoist or crane.
- Check if the wire rope, chains and hooks are free from damage.
- Always use lifting equipment which has ample capacity. Install the lifting equipment at the correct places.
- Use a hoist or crane and operate slowly to prevent the component hitting any other part.
- When disassembling or assembling, support the machine with blocks, jacks or stands before starting work.
- Before starting work, lower the forks or any other work equipment to the ground.
- Do not work under the equipment when the equipment is not sufficiently supported.

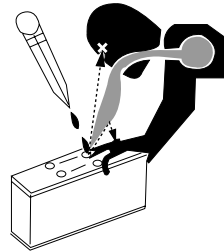


ELECTRICAL SYSTEM

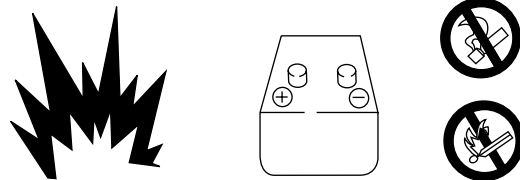
- When welding on the machine or working on the electrical system, ALWAYS turn the key switch OFF and remove the lead from the battery negative (-) terminal.
- When removing components, be careful not to break or damage the wiring. Damaged wiring may cause electrical fires.



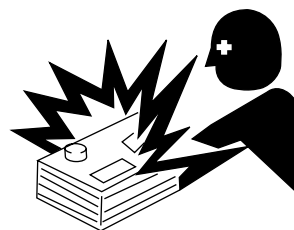
- When working on the battery, wear goggles or safety glasses.
- Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin and eat holes in clothing and cause blindness if splashed into the eyes. If you spill acid on your clothes or skin, immediately flush with large quantities of water.
- If splashed into the eyes, flush with water and get medical attention immediately.



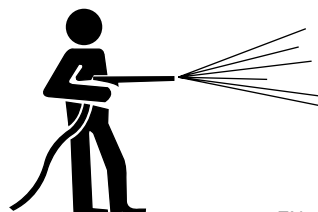
- Keep sparks, lighted matches, and open flame away from the top of battery. Battery (hydrogen) gas can explode.



- Battery posts and cables touched by metal objects can short circuit and burn you. Keep tools away from posts, wires and terminals. Tighten the battery terminals to ensure good contact.
- When disassembling and assembling the battery, make sure that the battery terminals are correctly connected.



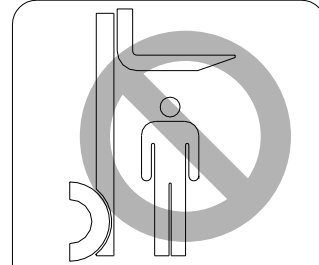
- If water gets to the electrical system, abnormal operation or failure can result. Do not use water or steam on sensors, connectors and instruments in the cab.



EX034

CAUTIONS DURING OPERATION**NEVER STAND UNDER FORKS**

- Do not allow anyone to stand or walk under the elevated forks, or load.
Failure to comply can cause serious injury or death.



FX027

ROTATING PARTS / ALIGNING HOLES

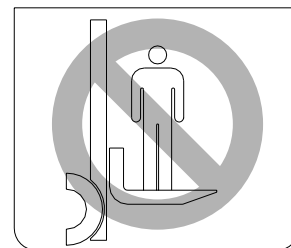
- Never touch rotating parts such as the fan blades or fan belt.
- When aligning two holes, never insert your fingers or hand.
Be careful not to get your fingers pinched in a hole, or between parts or tools.



EX035

NEVER RIDE ON FORKS

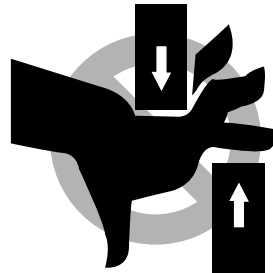
- Never use the forks to lift people.
Failure to comply can cause serious injury or death.



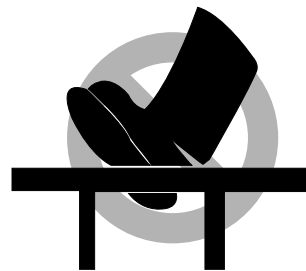
FX028

PINCHING AND FALLING

- Do not put your head, hands, arms or feet into the mast.
Entanglement in the mast can cause serious injury.
- Do not use the mast as a ladder.
Falling from the mast can cause serious injury.



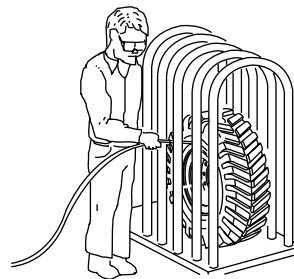
FX028



FX030




INFLATING TIRES







- Do not add air pressure immediately to the tires when the air pressure is low. Inspect the rim for damage.
If air pressure is added to the tire when the rim is damaged, the tire can be exploded causing serious injury or death.
- Check the valve stem, tread, and side wall for air pressure leaks.
- The tire must be inflated by trained personnel only.
- Make sure there is enough hose to permit the operator to stand away from the safety cage when air pressure is added to the tire.
- Add air pressure to the tires only in a safety cage, as illustrated.
- Always wear safety glasses.



EW013

⚠ IN CASE OF TIP – OVER

 WARNING	 <p>Lateral tip – over can occur if the fork lift is improperly operated. Don't risk injury or death.</p> <p>Slow down before turning!</p>	 Buckle up belt Stay in seat
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 DANGER	 <p>IN CASE OF TIP-OVER Follow these instructions :</p>	 Lean away	 Hold on steering wheel	 Brace feet	 Don't jump!
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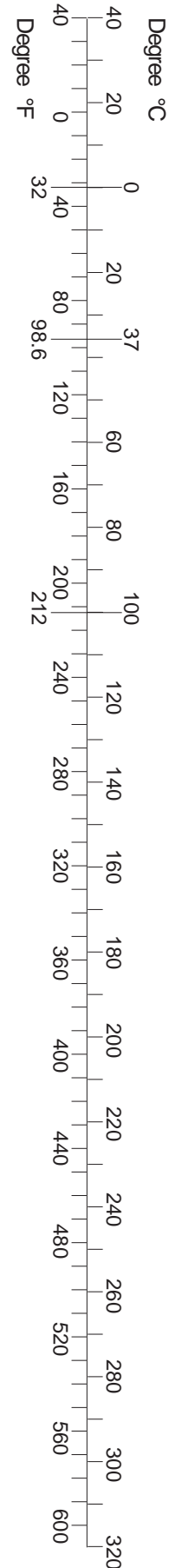
Be extremely careful to prevent the fork lift from tipping over during operation. Decelerate the fork lift sufficiently when turning a corner or tight curve.

The following precautions should be closely observed to ensure safe operation of the fork lift as well as to protect other persons against injury.

- ⚠** Always make sure that your seat belt is securely fastened and the top panel latch is in the locked position.
- ⚠** If the fork lift begins to tip. **DO NOT ATTEMPT TO JUMP CLEAR.** The fork lift will fall faster than you can jump.
 Brace your feet and hold yourself inside the operator compartment by holding onto the steering wheel with both hands.

APPROXIMATE CONVERSIONS

SI Unit	Conv Factor	Non – SI Unit	Conv Factor	SI Unit
Torque				
newton meter (N·m)	× 10.2	= kgf·cm	× 0.8664	= (lb·in)
newton meter (N·m)	× 0.74	= lbf·ft.	× 1.36	= N·m
newton meter (N·m)	× 0.102	= kgf·m	× 7.22	= (lbf·ft.)
Pressure (Pa = N/m²)				
kilopascal (kPa)	× 4.0	= in. H ₂ O	× 0.249	= kPa
kilopascal (kPa)	× 0.30	= in. Hg	× 3.38	= kPa
kilopascal (kPa)	× 0.145	= psi	× 6.89	= kPa
(bar)	× 14.5	= psi	× 0.069	= (bar)
(kgf/cm ²)	× 14.22	= psi	× 0.070	= (kgf/cm ²)
(newton/mm ²)	× 145.04	= psi	× 0.069	= (bar)
megapascal (MPa)	× 145	= psi	× 0.00689	= MPa
Power (W = J/s)				
kilowatt (kW)	× 1.36	= PS (cv)	× 0.736	= kW
kilowatt (kW)	× 1.34	= HP	× 0.746	= kW
kilowatt (kW)	× 0.948	= Btu/s	× 1.055	= kW
watt (W)	× 0.74	= ft·lb/s	× 1.36	= kW
Energy (J = N·m)				
kilojoule (kJ)	× 0.948	= Btu	× 1.055	= kJ
joule (J)	× 0.239	= calorie	× 4.19	= J
Velocity and Acceleration				
meter per sec ² (m/s ²)	× 3.28	= ft/s ²	× 0.305	= m/s ²
meter per sec (m/s)	× 3.28	= ft/s	× 0.305	= m/s
kilometer per hour (km/h)	× 0.62	= mph	× 1.61	= km/h
Horse Power/Torque				
BHP × 5252 R.P.M. = TQ (lb·ft)		TQ × R.P.M. 5252 = B.H.P.		
Temperature				
°C = (°F – 32) ÷ 1.8		°F = (°C × 1.8) + 32		
Flow Rate				
l /min (dm ³ /min)	× 0.264	= US gal/min	× 3.785	= l /min



Note : () Non–SI Unit

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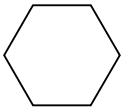

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STANDARD TIGHTENING TORQUE

The following charts give the standard tightening torques of bolts and nuts.
Exceptions are given in sections of "Disassembly and Assembly"

METER TABLE

Classification	4T, 5T	10T
Bolt type		
Bolt size	Torque kgf·m (lbf·ft)	Torque kgf·m (lbf·ft)
M4	0.2 ± 0.02 (1.4 ± 0.1)	0.4 ± 0.04 (2.9 ± 0.3)
M5	0.3 ± 0.03 (2.2 ± 0.2)	0.8 ± 0.08 (5.8 ± 0.6)
M6	0.5 ± 0.05 (3.6 ± 0.4)	1.4 ± 0.14 (10.1 ± 1.0)
M8	1.2 ± 0.12 (8.7 ± 0.9)	3.3 ± 0.3 (23.8 ± 2.2)
M10	2.3 ± 0.23 (16.6 ± 1.7)	6.5 ± 0.7 (47 ± 5)
M12	4.0 ± 0.4 (29 ± 3)	11.3 ± 1.1 (82 ± 8)
<M14>	6.4 ± 0.6 (46 ± 4)	17.9 ± 1.8 (129 ± 13)
M16	9.5 ± 0.9 (69 ± 6)	26.7 ± 2.7 (193 ± 19)
<M18>	13.5 ± 1.4 (97 ± 10)	38.0 ± 3.8 (274 ± 27)
M20	18.6 ± 1.9 (134 ± 14)	52.2 ± 5.2 (377 ± 38)
<M22>	24.7 ± 2.5 (178 ± 18)	69.4 ± 6.9 (500 ± 50)
M24	32.1 ± 3.2 (232 ± 23)	90.2 ± 9.0 (650 ± 65)
M30	62.6 ± 6.3 (452 ± 45)	176.1 ± 17.6 (1270 ± 127)
M36	108.2 ± 10.8 (781 ± 78)	304.3 ± 30.4 (2200 ± 220)
M42	171.8 ± 17.2 (1240 ± 124)	483.2 ± 48.3 (3500 ± 350)
M45	211.3 ± 21.1 (1525 ± 152)	594.3 ± 50.4 (4300 ± 430)