Hydraulic Training Systems

Teaching and learning hydraulics in real-time

MF102 Series Hydraulic Training Simulators -

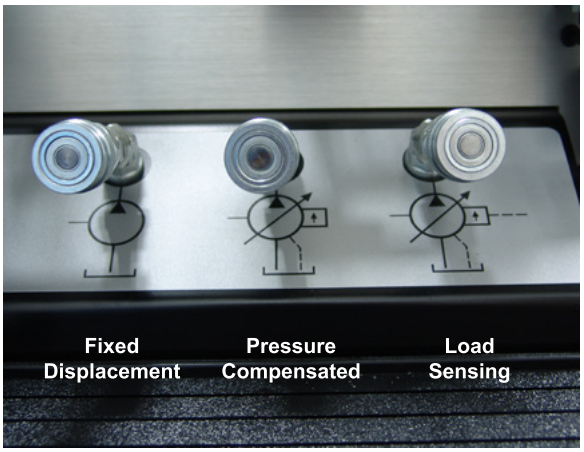
Handcrafted with pride in AMERICA

Main features that make the MF102 Series Hydraulic Training Simulators uniquely different to any other simulator in the world -

1. Teach three operational environments -
   - Fixed displacement pump - standard
   - Pressure-compensated pump – standard
   - Load-sensing pump – optional

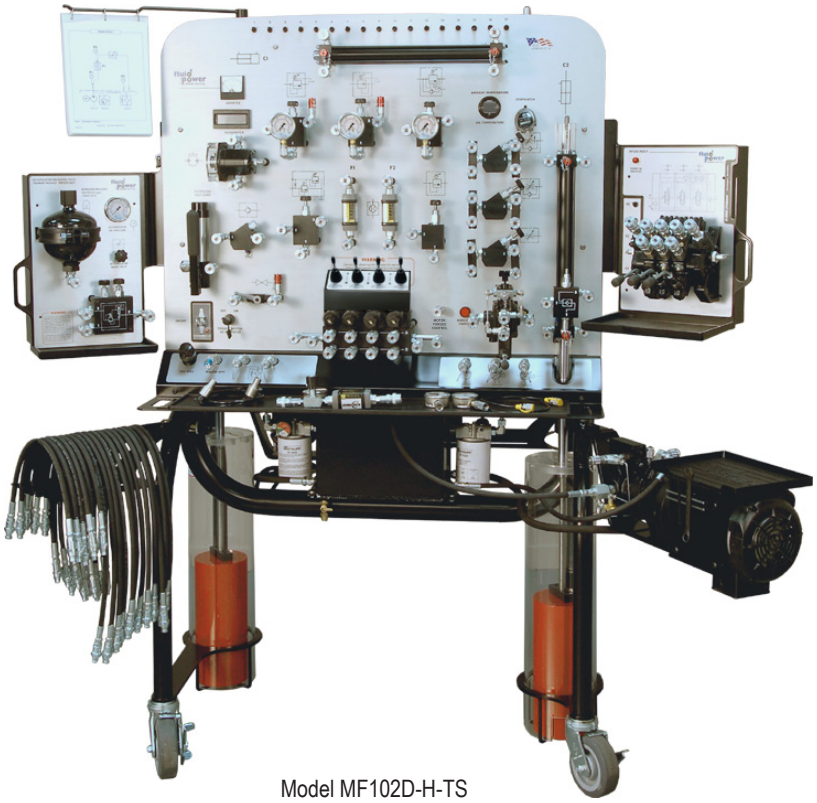
Students advance from fixed displacement pump circuits, to pressure-compensated pump circuits, and, if the curriculum permits, load-sensing circuits, on one training simulator.

Why this feature is important:
The most logical learning path for a student is to begin with fixed displacement pumps, and then advance to pressure-compensated pumps and then to load-sensing pumps.



The MF102 series simulators provide instructors the opportunity to teach all of these popular systems.

2. Six directional control valves -
   - Three (3) industrial-type (parallel)
   - One (1) industrial-type (series)
   - One (1) mobile-type (cylinder spool center)
   - One (1) mobile-type (motorr spool center)



Model MF102D-H-TS
with optional MF100-ACC Accumulator module
and MF100-MDCV-TS Mobile Directional Control Valve module

Why these features are important:
Students graduate from learning simple, single-valve/single actuator, circuits to constructing the types of circuits they will see in any plant or on any construction machine. There is almost no limit to the number and variety of circuits students can construct on the MF102 series simulators.

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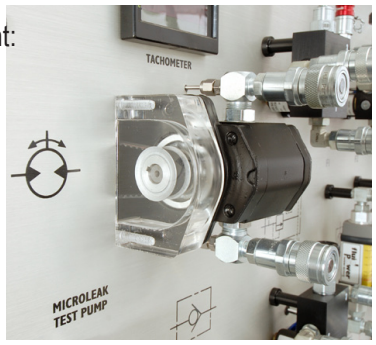
3. Three (3) actuators -
   - One (1) double-acting, single rod cylinder - 36 cm (14") stroke
   - One (1) double-acting, double rod cylinder - 36 cm (14") stroke with load engage/disengage
   - One (1) bi-directional hydraulic motor with infinitely variable torque

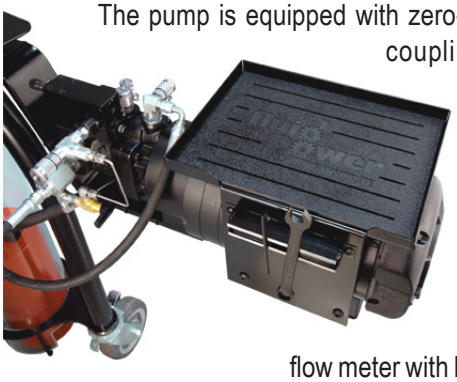
Why this feature is important: Generous cylinder stroke length gives students time to study flows and pressures without the frustration of repeated activation associated with short-stroke cylinders. Cylinder and motor load capability gives students the opportunity to learn in a real-time atmosphere.



Bi-directional hydraulic motor with infinitely variable torque

Three operating environments, five directional control valves, two cylinders, a motor and almost every component typically found in industrial and mobile hydraulic systems means students can build a wide variety of circuits from the most basic to advanced for a stimulating, challenging and realistic learning experience.

4. Swing-out power-unit and hose storage caddy -
   Why these features are important:
- Power-unit assembly - the entire power unit swings out into plain sight for easy and unencumbered access to the pump and electric motor. It is mounted waist-high to prevent student fatigue as they learn critical pump pre-start, and post-start adjustment procedures such as flow and pressure.



The pump is equipped with zero-leak, pressure test couplings, which permit time-saving diagnostic instrument installation. All diagnostic equipment is included: vacuum gauge, pressure gauge, flow meter with load cell, and digital, non-contact tachometer.

- Stow-away hose rack - the hoses and "T's", which students use to construct circuits, are conveniently stored in a rack, which stows away when the simulator is not in use. When needed, the student simply rotates the rack into position on the left-hand side of the simulator and out of the way of the work area.

5. Increased versatility with the FlexPlate -
   Why this feature is important:
   Want to add additional components to suit your unique training needs? We made it easy by adding the FlexPlate.

Simply fasten your unique component to a universal mounting plate (available from FPTI™) and when needed clip it on the FlexPlate - no hardware needed.
There is also a convenient 24VDC power supply and illuminated on/off switch for electric valves.
Many of the add-on valves are available - ready-to-use - from FPTI™. See the entire assortment at:
www.fluidpowertraininginstitute.com

If you don't see what you are looking for on our website let us know and we will build it for you - ready to use.

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MF102 Series Hydraulic Training Simulators -

6. No simulator has more diagnostic instrumentation available than the MF102 series -
   Why this feature is important:
   One of the most critical aspects of hydraulic education is to learn how to safely and effectively monitor hydraulic system performance. This must be done when performing system evaluation, proactive maintenance and diagnostic procedures. Even the most basic MF102 has an impressive line-up of diagnostic instruments available for use including: three (3) pressure gauges with quick-connect/disconnect valves; dual flow meters; digital panel-mounted tachometer (hydraulic motor RPM); digital panel-mounted ambient and oil temperature gauges; panel-mounted analog ammeter; and, self-retractable stop-watch. In addition to these, the "TS" models have available:
   Vacuum gauge - 76 cm (0-30") Hg (mercury)
   Case pressure test gauge - 0-6.9 bar (0-100 PSI)
   Inline flow meter - 7.57 Lpm (0-2.0 GPM) with integral load-cell and pressure gauge
   Digital, non-contact, laser guided tachometer

   The diagnostic instruments are by no means inexpensive imitations of the real thing, they are the actual instruments currently used by professionals in the industry.

7. Unmatched diagnostics learning capability (TS models):
   Why this is an important feature:
   The MF102-H-TS series designer conducted an extensive study of leakage rates in hydraulic components related to wear – the most common cause of hydraulic component failure.
   His design team designed the identical leakage rates into almost every component on the simulator. By either manually activating switches (TS model) or automatically via an board PC touchscreen (TSE model) the components on the simulator can "wear out" giving the students the ability to learn critical diagnostic procedures in real time.

8. Pressure/leak testing (TS models) -
   Why this feature is important:
   Pioneered by FPTI™, pressure/leak testing is a unique technique for testing the vast majority of hydraulic components. Using the on-board MicroLeak® test pump students will learn how to test 95% of the components in any industrial or mobile hydraulic system with the power-unit safely locked out. There is also no need to disassemble or remove a component, and each test averages approximately ten minutes.

9. Not just a training simulator, an entire turnkey training system -
   Why this feature is important:
   Not only do you get the most advanced hydraulic training simulator in the world, you also get everything you need to conduct a world-class course:
   - Textbooks - written and produced by one of the most successful and renowned hydraulics instructors in the industry - FPTI™'s founder Rory S. McLaren. Every topic is to the point and safety-based.
   - Student workbooks - well written and superbly illustrated with need-to-know information.
   - PowerPoint™-based CD's covering at least 40 hours of instruction in hydraulics and another 40 hours of advanced diagnostics.
   - Instructor answer books.
   - Interactive CD - makes teaching and learning hydraulic symbols fun and challenging.
   - Optional: A set of CD's "How to Teach Hydraulics." An entire course on hydraulics, broken up into segments, produced and narrated by Rory McLaren.

   "My success is based on my ability to explain hydraulics in a manner anyone can understand. Let me use my simulators, my PowerPoint™ presentations, and my techniques to show you how to make the task of teaching hydraulics simple and straightforward."
   - Rory S. McLaren

   NOTE: These CD's are absolutely ideal for instructors who are currently teaching other industrial courses.

Everything you need to conduct a "world-class" course is included

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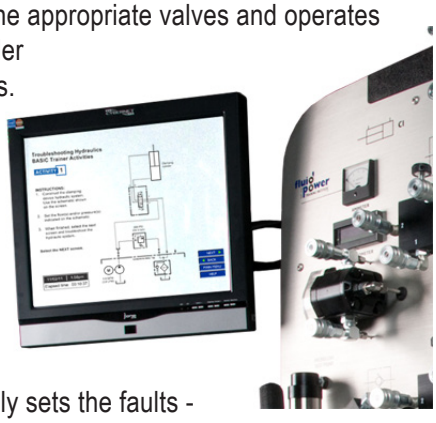
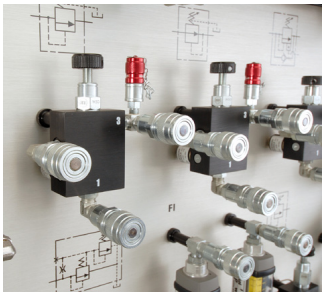
10. Panel PC with 19" full-color touch-screen gives the MF102-H-TSE unmatched diagnostics capability -
Why this feature is important:
One of the most amazing features of the "TSE" model is its diagnostics teaching and learning capability. From a schematic on the touchscreen, the student constructs, for example, an entire forklift hydraulic system. Once constructed, the student sets the appropriate valves and operates the mast lift cylinder with load – it holds. Then, based on a complaint from the operator, e.g., the load is drifting down, the student selects the next screen, which automatically sets the faults - either the cylinder seal is set to leak or the directional control valve is set to leak. When the student raises the load and returns the directional control valve to neutral, the load on the cylinder actually drifts.



Now let's say, for example, the student tests the directional control valve and determines it is leaking, when he/she touches the corresponding symbol on the touchscreen, it automatically fixes the valve - the leak stops and returns the system to normal.

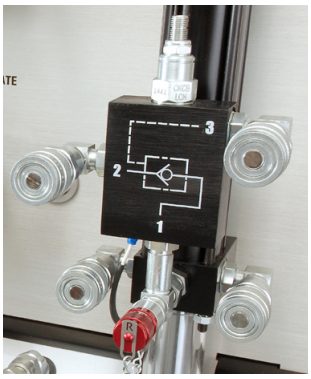
The MF102-H-TSE is arguably the most advanced hydraulic training simulator in the world. However, it is without question the most advanced diagnostics trainer currently available.

11. Safety – the nucleus of FPTI™ product design -
Why this feature is important:
The MF102 series hydraulic training simulators are loaded with one-of-a-kind safety features:
• Electrical System -
The electrical system is equipped with a lockout mechanism so students can learn critical federally and state mandated lockout procedures.
• De-energization and Verification -
Hydraulic system de-energization and verification is achieved with FPTI™'s exclusive Safe-T-Bleed® system. An inherent problem with training simulators is quick-connect/disconnect hydraulic lock, which typically occurs when students make inadvertent connection errors. This leaves students with two inherently hazardous options: strike the connector to force it open, or, partially unthread it to release the pressure. These safety issues are avoided on FPTI™ products by installing Safe-T-Bleed® connectors at points where hydraulic lock can occur. Using the Safe-T-Bleed® hose (supplied) the student effortlessly releases the pressure without ever having to resort to hazardous procedures.



• No Pinch-Points -
All pinch-point areas are covered with transparent covers.
• Industry-standard Cautions and Warnings -
Appropriate safety cautions and warnings are permanently affixed to the simulator for instructors and students to read.
• Embedded Safety -
Safety is also reinforced throughout the written training materials and PowerPoint™ slides.

12. Port identification consistent with industry standards -
Why this feature is important:
It is absolutely critical that students learn how important it is to make proper transmission line connections when installing hydraulic components or reconnecting transmission lines. An error can result in severe injury or death. Component manufacturers typically use letters and/or numbers for port identification. All components on FPTI™ simulators are marked with the appropriate identification. Also, all hydraulic schematics in the student activities manuals show the appropriate markings.



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MF102 Series Hydraulic Training Simulators -

13. FPTI™ respects and appreciates the capital investment schools make in training equipment:
    There is absolutely no substitute for hands-on learning particularly when it applies to teaching and learning hydraulics, and there is no better way to teach and learn hydraulics than with FPTI™'s wide range of hydraulic training simulators.

    Training simulator duty-cycle is unique and demanding. Students spend hours "experimenting" as they constantly make and break connections to and from components. They constantly turn adjustment knobs as they learn how to make critical pressure and flow adjustments. We know this because FPTI™ simulators were built and used by FPTI™ instructors for ten years before they were made available to the market. They were trucked throughout the U.S.A. and Canada, which is why they are built with the heaviest duty frames and casters in the industry. In addition:
    - All fabricated components are finished with a durable powder coat.
    - All hydraulic components are manufactured by the leaders in their respective fields.
    - All permanent transmission line connections are O-ring, face-seal type conforming to SAE-J1453 standard.

14. Products designed by educators for educators:
    - FPTI™ is the only company in the U.S. that has a world-renowned instructor as its founder and chief designer. His extensive background in all facets of hydraulics from design to diagnostics, made it possible for him to not only design the most advanced hydraulic training simulators in the world, but to write and produce training materials and textbooks that are practical, safety-based, and to the point.

    - FPTI™ is not a hydraulic component manufacturer. This eliminates component bias and subliminal marketing.

    - FPTI™ designs and manufactures fluid power training products exclusively. That is why FPTI™ builds the best and most effective hydraulic training simulators in the world. We can also train your instructors to deliver world-class hydraulic training courses, and we can provide assistance in curriculum design.

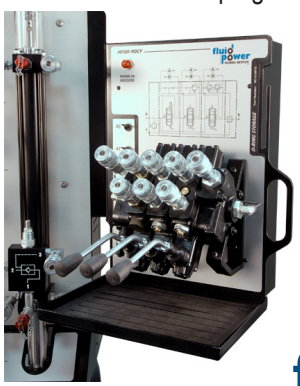
    - FPTI™ writes, produces, and publishes all student and instructor workbooks, and develops all the visual aids, i.e., PowerPoint™ presentations, interactive DVD's, and CD's. This is why the entire curriculum is safety-based and realistic containing only "need-to-know" information.

15. Efficient and convenient use of space and energy:
    - Efficient space utilization - laboratory space is limited and expensive. In many cases all an instructor has to train in is a classroom. The MF102 series hydraulic training simulators are designed with this in mind. The footprint is a mere 76 cm (30") deep by 122 cm (48") wide by 196 cm (77") high. It is designed to fit through a standard doorway.

    - Energy savings and convenience - A MF102 series hydraulic training simulator with dual stations has dual power-units. Both power-units can operate from a single 120VAC, 20-amp circuit. The aesthetic frame design leaves the floor-space below the simulator accessible for cleaning.

    - A friend of the environment and your insurance company - All temporary hose connections are made with zero-leak, flat-face type quick-connect/disconnect valves This means no oil leaks thus minimizing the potential for slip-hazards. There is also no need to purchase consumables for mopping up oil or to invest in expensive equipment and services to dispense of hazardous waste.

16. Plug-and-Play modules give the MF102 series unlimited training flexibility:
    Want to teach mobile directional control valves; proportional direction/flow control valves; stacked valves; orbitrol steering systems; logic valves; etc? Simply purchase an affordable plug-and-play module, which easily attaches to either side of the MF102 series simulator. The modules are designed to integrate seamlessly with the components on any model MF102. Most plug-and-play modules are available with diagnostics capability.



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MF102 Series Hydraulic Training Simulators -

Specifications (Model MF102-H) -

The standard MF102 series simulators are equipped with the following components:

1. Pump - Axial piston-type, variable volume, pressure-compensated; 3.78 Lpm (1.0 GPM); 69 bar (1000 PSI); adjustable pressure compensator; adjustable flow
2. Electric motor - Single-phase; 115V; TEFC; 1750 RPM; C-face; thermal overload protection
3. Electric motor on/off switch - Lockout/tagout mechanism; thermal overload protection with manual reset
4. Hydraulic reservoir - capacity 17 liter (4.5 gallon)
5. Filtration - 10 micron, spin on/off element w/bypass gauge
6. Directional control valves - five (5) total;
   - One (1) DO3-type; tandem-center; 3-position; 4-way; spring-centered; solenoid-controlled; 24V coils. Also includes sandwich-mounted, dual, knob-adjustable flow control valves
   - Two (2) DO3-type; closed-center; 3-position; 4-way; spring-centered; solenoid-controlled; 24V coils. Also includes sandwich-mounted, dual, knob-adjustable flow control valves
   - One (1) DO3-type; float-center; 3-position; 4-way; spring-centered; solenoid-controlled; 24V coils. Also includes sandwich-mounted, dual, knob-adjustable flow control valves
   - One (1) Monoblock type valve; cylinder spool; 3-position; 4-way; spring-centered; hand-lever operated w/pressure relief valve
7. Pilot-operated pressure relief valve w/knob adjustment
8. Direct-operated pressure relief valve w/knob adjustment
9. Sequence valve w/knob adjustment
10. Pressure reducing valve w/knob adjustment
11. Counterbalance valve with internal reverse flow check w/knob adjustment
12. Needle valve w/knob adjustment
13. Flow control valve w/knob adjustment
14. Pressure-compensated flow control valve; restrictor-type; reverse flow bypass; w/knob adjustment
15. Check valve w/knob adjustment
16. Pilot-operated check valve w/manual override
17. Cylinder - single-rod; double-acting; 36 cm (14") stroke
18. Cylinder - double-rod; double-acting; 36 cm (14") stroke; w/load engage/disengage mechanism
19. Motor - bi-directional; gear-type; w/infinitely variable torque capability
20. Flow meters - two (2); 7.56 Lpm (0-2.0 GPM)
21. Tachometer- digital-type; panel-mount; hydraulic motor shaft speed
22. Ammeter - analog-type, panel-mount
23. Dual scale temperature gauge - digital-type; panel-mount; upper: oil temperature; lower: ambient temperature
24. Stopwatch - digital, self-retractable
25. Pressure gauges - three (3); 103 bar (0-1500 PSI); PSI and bar scales; 6.35 cm (2.5"); glycerine-filled; Bourdon tube type; w/flat-face type quick-connect/disconnect type valves
26. Load - 45 Kg (100 lb); Engage/disengage with mechanical latch. Entire weight is contained within a transparent safety enclosure.
27. Hose storage caddy - stow-away/swing-out
28. Hoses -
    - Six (6) - 61 cm (24"); SAE 100-R1; w/flat-face type quick-connect/ disconnect type valves
    - Twelve (12) - 102 cm (40"); SAE 100-R1; w/flat-face type quick-connect/ disconnect type valves
    - Two (2) - Hose extenders w/flat-face type quick-connect/ disconnect type valves
29. T's - six (6); w/flat-face type quick-connect/ disconnect type valves

Mechanically-engaged and fully-enclosed weight/load system

All FPTI™ simulators are available for operation at any voltage or frequency

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MF102 Series Hydraulic Training Simulators -

Specifications (Model MF102-H-TS) -

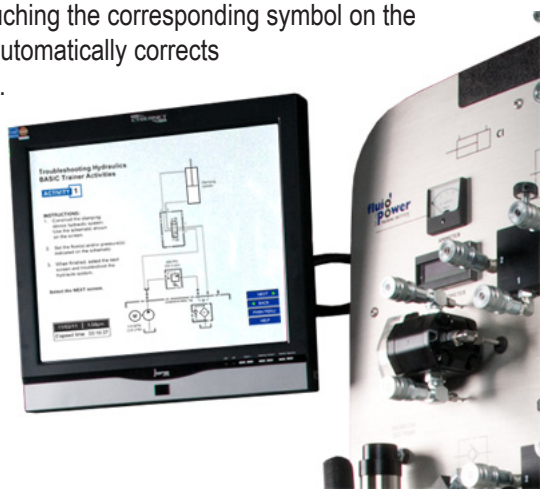
In addition to the above-mentioned components, the TS models have seventeen (17) panel-mounted switches, which transform the following components from normal operating mode to worn mode for diagnostics teaching and learning:

1. Double-rod, double-acting cylinder
2. Direct-operated pressure relief valve
3. Pilot-operated pressure relief valve
4. Sequence valve
5 Counter-balance valve
6. Pressure-reducing valve
7. Pilot-operated check valve
8. Check valve
9. Directional control valves:
   - DO3-type; open-center; 3-position; 4-way; spring-centered; solenoid-controlled; 24V coils
   - DO3-type; closed-center; 3-position; 4-way; spring-centered; solenoid-controlled; 24V coils
   - DO3-type; open-center; 3-position; 4-way; spring-centered; solenoid-controlled; 24V coils
   - DO3-type; tandem-center; 3-position; 4-way; spring-centered; solenoid-controlled; 24V coils
10. Bi-directional motor
11. Pump
12. Directional control valve solenoid current fault

Specifications (Model MF102-H-TSE) -

The TSE models are equipped with the same components as the “H” and “TS” models. However, instead of manual fault switches, they have on-board panel PC’s with integrated, 48 cm (19”), full-color, touch-screens.

The advantage of the touch-screen is that the component faults can be introduced automatically. When a defective component is found, touching the corresponding symbol on the schematic automatically corrects the problem.



Diagnostic instruments available with all TS/TSE models:

1. Pressure/leak test pump w/quick-connect/disconnect valve
2. Inline flow meter - 7.6 Lpm (2.0 GPM); w/integrated load cell and pressure gauge 103 bar (0-1500 PSI)
3. Tachometer - digital; laser-guided; contact and non-contact.; w/storage case
4. Pressure gauge - case pressure testing; 6.9 bar (0-100 PSI); w/test connector
5. Vacuum gauge - 76 cm (0-30”) Hg (mercury); w/test connector

Some of the diagnostic tools available with each TS and TSE model

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MF102 Series Hydraulic Training Simulators -

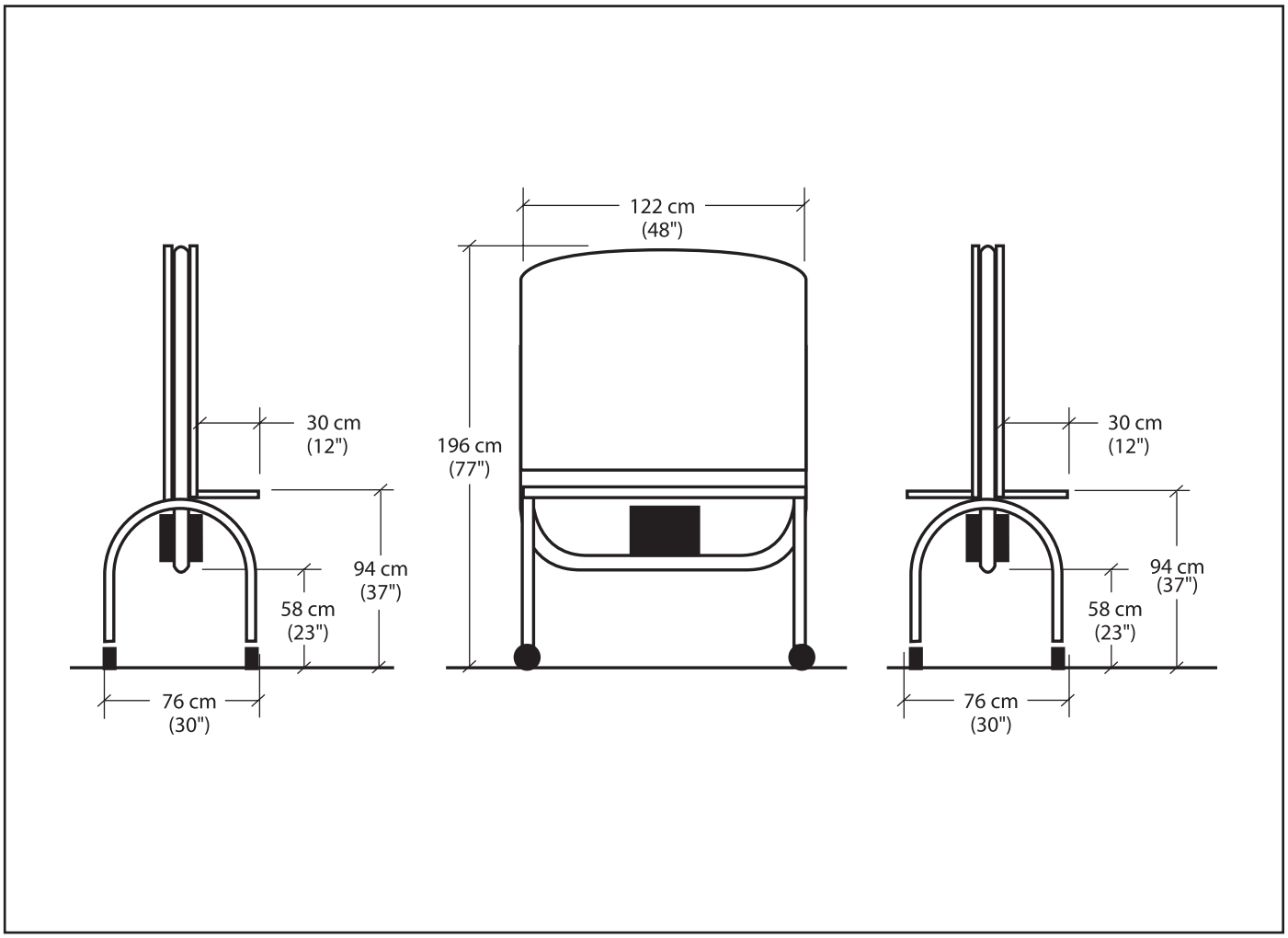
Shipping Specifications -

Shipping weight (does not include pallet or packaging):
Double unit: 408 kgs (900 lbs)
Single unit: 340 kgs (750 lbs)

Shipping dimensions (all models):
196 cm (77.0”) tall x 122 cm (48.0”) wide x 76 cm (30.0”) deep

Warranty -

FPTI™ warrantees it’s products against defect in materials or workmanship for a period of two (2) years from date of delivery.



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