

TOMATO GRADING STATION mod. SV01
OPERATIVE SPECIFICATIONS

Application:	Complete evaluation of the quality of a tomato juice sample reduced to juice and successive measurement of the “pH”, and “Concentration” values and the “Lycopene/Colour”, on delivery to the tomato processing industry.
Basic functions:	Weighing a “Gross” quantity of tomato sampled and successive washing with automatic removal of earth and small inert materials. Manual grading and weighing of reject categories such as: Green, Rotten, Crushed, grouped Automatic grinding of a tomato sample. Automatic refractometric measurement of the Refractive Index of the “Tomato Juice” and display of the relative concentration in the “BRIX” scale already compensated for temperature Automatic measurement by means of “Electrode” with polymer electrolyte and display of the relative “pH” value, already compensated in temperature, by means of the Receiver provided Automatic spectrophotometric measurement of the colorimetric coordinates L, a, b and lycopene concentration levels in mg/100 g, with relative display of values. Processing the evaluation on PC and printing the relative report.
Weighing samples	Measurement limits: 100 kg Accuracy: > ± 0.02% Reading resolution: 10 g
Concentration measurement	Measurement limits: 1.3330...1.3478 nD (0...10 Brix) Accuracy: max. accuracy ±0.0002 nD (±0.15 Brix) Measurement scale: “BRIX” referred to conversion table nD/Bx ICUMSA (1974)
pH measurement	Measurement limits: 2...14 pH Accuracy: ±0.05 pH Reading resolution: 0.01/0.1 pH
Color/lycopene measurement	Colour repeatability: $\Delta X, \Delta Y, \Delta Z < 0.07$ Lycopene measurement limits: 0...80 mg/100 g Lycopene accuracy: Higher than 5% of the given reading Maximum accuracy: 0.5 mg/100 g Lycopene repeatability: Higher than ±0.25 mg/100 g Quantity of gradable tomato: ~20 kg recommended Quantity of grindable tomato: ~4 kg/cycle Sample washing time: average 60 s with 20 kg Grinding duration: 60 s Grinding and analysis duration: 125 s Total cycle duration: average 4 min with 20 kg

GENERAL SPECIFICATIONS

Power supplies	Electrical: AC 3/N/PE 400V ±10% 50...60Hz 10kW Connections by means of junction box. Pneumatic: Dehydrated air 6...10 bar (87...145 psi). expected consumption ~2 l/min; Connection via “quick-release coupling” for plastic tube with diameter 6x4 mm. Water: Water 1.5...4 bar (22...58 psi), expected consumption ~75 l/evaluation cycle; connection to connector provided by means of “2” Female Threaded Union”.
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CONSTRUCTION FEATURES

Notes:	The Tomato Grading System has a modular structure and basically comprises the following parts: Gross weight roller, Rotating drum tomato washer, Automatic grading and weighing bench, Juice preparation and analysis system, plant automation with PLC panel and “User friendly” touch screen for Operator interface, control PC, all installed, assembled and interconnected in a single prefabricated monoblock.
Supporting structure	Characteristics: Supporting structure for prefabricated module made of galvanized steel. 8 pillars with supporting flanges for fixing to cement plinths. Flat supporting base for prefabricated evaluation Module. Prefabricated metal stairway with service gangway. Prefabricated metal stairway with reception gangway (optional).
Prefabricated module	Features: Specially designed module with RAL 5003 painted steel posts, walls and cover made of 50 mm thick insulating sandwich panels made of washable pre-painted, mini-buckled steel plate, with self-extinguishing polyurethane foam packing. Base consisting of frame made up of galvanized tubular elements 120x80x2.0 mm and cross beams made up of 2.0 mm thick galvanized sections. Water-resistant/fire-resistant 19mm thick chipboard and 3mm thick aluminium buckle plate flooring Service access by means of ½ glass door with safety bars. Three windows with sliding doors complete with PVC shutters, mosquito netting, 4+4 mm anti-break in glass and silver anodized aluminium casing. Wall-mounted, split type 18000 BTU/h air conditioner with heat pump. Neon ceiling lights; circuits differentiated and protected by means of “Automatic Magnetothermal circuit breakers”, “Differential circuit breakers” and “Fuses”. 1 PLC control panel which handles, monitors and controls the working of all the electro-mechanical apparatus comprising the plant and acquires the weights and values of measurements made by the instruments within the evaluation cycle, to be sent to the Data Processing Computer. 1 Touch Screen inserted on the front door of the Electric Panel, to be used by the Operator for all plant calibrations and system Input/Output diagnostics. Central Air Treatment Unit consisting of On/Off valve, Filter with automatic condensate drainage and Pressure regulator. The Module is designed for installation inside a special galvanized steel (or brickwork) supporting structure to adapt it to the height of the Sampling System.
Furnishings:	Desk complete with “writing table” and drawers to hold the control PC. Magnetic wall-mounted blackboard. INOX AISI 304 work bench complete with built-in sink, drip tray for glassware and accessories.
Gross weighing roller	Function: Weighing quantity of sampled “Gross” weight.
Features:	Specially designed INOX AISI 304 structure with rollerway and weighing table; fixed to module by means of self-levelling fittings. 1 Deflection Load Cell (IP65) fitted by means of brackets with rubber vibration dampers. Weight display and processing by means of Receiver with microcontroller, with 6-digit 14 mm display with seven segments, hooked mechanically and connected electrically to the roller.
Dimensions:	700 (w) x 1600 (h) x 770 (d), ~50 kg
Rotating drum tomato washer	Function: Washing of the sample “Gross” quantity of tomatoes to remove earth and small inert materials.
Work cycle:	The tomato is introduced by the operator after initial weighing by emptying the container into the “inlet opening”.
Features:	Specially designed INOX AISI 304 structure with water tank. Automatic tomato feed into the machine by means of “Perforated auger rotating drum”. Double washing system supplied with water from the mains and recirculated water. Variable auger speed with adjustment by means of reduction gear; max. ~240 kg/h. Centrifugal pump complete with manual regulator valve. Removable filter grille to protect recirculation pump.
Dimensions:	1840 (w) x 1750 (h) x 780 (d), ~200 kg
Automatic grading and weighing bench	Function: Manual grading and weighing of quantity of tomato selected in different categories; the system acts by taking product from the initial Gross quantity.
Work cycle:	The tomato is automatically introduced into the bench after washing by rolling from the Tomato

	washer "Outlet opening".
Features:	INOX AISI 304 structure specially designed with self-weighing grading Table fixed to the outer frame. 3 Deflection Load cells (IP65) fixed by means of brackets to weighing table. 5 Grading trays installed on a tilting system to collect the tomatoes selected separated into "reject" categories. Automatic unloading of grading trays by means of electrically-operated pneumatic piston. Powerful jet spray for washing bench with pneumatic stop valve. Display and processing of weight by means of Receiver with microcontroller, fitted with 6-digit 14mm display with seven segments, hooked mechanically and connected electrically to the bench.
Dimensions:	2500 (w) x 1055 (h) x 650 (d), ~150 kg
Juice preparation and analysis system	Execution: INOX AISI 304 structure specially designed with access to the various machine sections by means of 3 doors fitted with locks.
Function:	System administration, operator interface, interface with the ancillary elements and with the process plant.
Work cycle:	The tomato is introduced manually in the System after grading and weighing; the subsequent cycle proceeds automatically.
Features:	"PLC" with microprocessor "CPU". Polycarbonate "Primary" box (IP55) to house the "Electronic Control Section". Polycarbonate "Secondary" box (IP55) to house the "Electric Power Section". "Operating Controls" and "Indicator Lights" relative to the main cycle phases by means of modular components on a Ø22 panel. "Automatic" Operating Cycle. Manual "Diagnostics" commands for activation of "Motor" and "Washing System". Electric protection against accidental opening of access doors to the machine by means of "Safety Limit switches".
Juice preparation system:	Function: Grinding tomato sample to reduce it to juice.
Execution:	INOX AISI 304 cylindrical sampling tank with 3" "Tri-Clamp®" union for fixing Process Refractometer UR20/24.
Features:	Grinding tomato by means of "Overlapping circular blades" that can be removed without using tools Blade rotation by means of 1.5HP-2850 rpm "Self-braking Motor". PVC tank cover with "Safety limit switch" for stopping motor immediately if opened during the cycle. Automatic washing with water at the end of each analysis cycle, pressure regulation by means of special Reducer. "Spray-Ball" Tank washing system. Drainage of process residue and washing; drainage system operated by means of electro-pneumatically controlled cylinder. Support for pH measurement electrode fixed by means of threaded ring nut.
Digital refractometer UR20/24:	Function: Refractometric measurement of Refractive Index of "Tomato Juice" and display of the relative concentration in "BRIX" scale, already compensated in temperature.
Execution:	Single-block casing with INOX AISI 304 cover, connected to sampling tank by means of 3" "Tri-Clamp®".
Measurements section:	Synthetic Sapphire" or "Optical glass" measuring prism. "LED" light source with electronic compensation. "CCD" detection element.
Electronic section:	Microprocessor "CPU". Measurement indication and software menu and alarm condition display by means of 128x24 characters backlit graphic LC display. Scratch-proof polyester keypad with dome-shaped keys.
Notes:	The optical section of the apparatus is dehumidified by means of Dehydrating Cartridge with Molecular Sieve.
Receiver transmitter RM01	Function: Measurement of pH value by means of "Electrode" with polymer electrolyte and display of reading in relative scale already compensated in temperature.
Execution:	Single-block "Polycarbonate" RAL 7035 painted, UV-resistant, non inflammable container; PVDF measuring electrode complete with Pt100 directly positioned on the Juice Preparation System Tank.
Electronic section:	Microprocessor "CPU". Indication of measurement and software menu display by means of 2x3 ½ digit + symbols, backlit

	alphanumeric LC Display. Scratch-proof polycarbonate control keypad with membrane keys.
Software:	Simultaneous reading of "Main Parameter" and "Temperature" with display of calculated value of measurement in process and indication of alarm condition, if any. Manual calibration of pH, mV, Temperature, Out mA scales with automatic buffers recognition. Proportional analog output on reading configurable in "Scale Start" and "Scale End" values. Measuring Unit for temperature scale selectable between °C and °F.
UK04 Spectrophotometric Unit	Function: Spectrophotometric measurement of the diffused reflectance of "Tomato Juice".
Execution:	Enbloc body with aluminium lid, installation to the sampling bowl via 3" "Tri-Clamp®" attachment Comes supplied with white calibration Target.
Measuring section:	Product interface window in "Fused silica". 10 monochromatic LED light sources (wavelengths 420– 470– 520– 568– 589– 620– 670– 880 nm) + interferential filter" light sources with sequential light up. Photodiode detection element.
Electronic section:	"Central Unit" with "CPU" microprocessor.
Notes:	The optics section of the unit is dehumidified by Resistances and the working temperature is set by a thermostat at ±0.25 °C.
Data acquisition system	Function: The Computer inside the Grading System, connected via RS232 serial to the PLC inside the System Control Panel, acquires and processes all the data concerning the weights and measurements obtained during the evaluation cycle, handles operator interface and calculates the discount percentage, and also handles Data Filing.
Electronic section:	"Personal Computer" with "Pentium" Processor with high complete configuration of Keypad, Mouse, flat screen 15" colour monitor, Laser or Inkjet printer, Network board, Modem.
Software:	Operating Software in Microsoft® Windows ambient with "Panel" display and "Pushbutton" commands. "Microsoft® Windows XP" resident operating system. Real-time display, modification and complete customization of all the functions, variables, and work parameters operating in the Grading System. Printing of bulletin showing producer's data, product features and evaluation results, discount percentage to be applied to the entire lot.
Dimensions SV01:	8500 or 9200 (b) x 3090 (h) x 2500 (d). weight SV01: ~4000 kg wired, at full load. Prefabricated module colours: External sections downpipes: BLU RAL 5003. Internal sections: TDM RAL 8019. Walls and Covers: WHITE/GREY RAL 9002.
Notes:	The SV01 System is a modular station. This Technical Data sheet refers to a complete standard configuration of the System. For the exact composition of each system and for obtaining the technical features concerning each of these from this data sheet, refer to the Offer or Confirmation attached to the Technical Data sheet.

TECHNICAL SPECIFICATIONS AND STANDARDS

Ambient characteristics	Temperature Limits: Ambient: 5...45 °C Storage: -20...+70 °C Humidity Limits: Ambient: 5%...95% (R.H. non-condensing) Storage: 5%...95% (R.H. non-condensing)
Conformity Directives:	MSD:2006/42/EC LVD: 2014/35/EU EMC: 2014/30/EU <i>Electrical System:</i> <i>Realized in total compliance with the Standards and Legislation currently applicable, especially as regards:</i> <i>Law 46 of 5.3.90 (Plant Safety Standards)</i> <i>PDR 447 of 6.12.91 regulation for implementation of Law 5.3.90 No. 46 concerning plant safety</i> <i>PDR 547 of 27.4.55 (Standards for prevention of accidents at workplace)</i> <i>CE mark shows conformity to listed EU Directives</i>