

## Master Panel

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### Product Description

The Master Panel shall provide lead/lag control and time based, automatic rotation of up to eight (8) boilers, when used in conjunction with LMV3 or LMV5 control systems. The Master Panel shall be expandable to include monitoring of individual boilers, deaerator (DA) feedwater tanks, surge tanks (ST), and economizers.

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### Sample Specification

1. The major components of the Master Panel shall consist of:
    - 7 inch, 10.4 inch, or 12.1 inch touch screen
      - HMIG3U base unit
      - Mounted in 24 x 24 x 10 inch NEMA 1 enclosure
        - Optional NEMA 4X and 12 enclosure
        - Optional NEMA 1, 4X, and 12 enclosure, with cooling fans
      - 16 million colors
      - Lithium battery for internal RAM storage
      - Backlit TFT LCD
      - 7 inch touch screen resolution is 640x480 (VGA), with NEMA 4X rated front display
      - 10.4 inch and 12.1 inch touch screen resolution is 800x600 (SVGA)
      - Two (2) Ethernet ports
    - TS-PLC-M241-40 IO programmable logic controller (PLC)
      - 64 MB system memory RAM
      - 8 MB programming capacity
      - 32 GB SD card slot for data storage
      - Ethernet port with RJ45 connector
      - USB port
      - Non-isolated serial link RS485 via RJ45 connector
      - Non-isolated serial link RS232 with DB9 connector
      - Lithium ion, non-rechargeable battery with four (4) year life span
    - TM3AM6 analog input/output card
    - TM3TI4 RTD input card for PT100 or PT1000 RTD inputs
  2. The Master Panel interface shall be capable of controlling up to eight (8) boilers, while operating LMV and/or RWF controls, with the following functionality:
    - Lead/lag operation with automatic boiler rotation, based on number of hours run or individual boiler startups
    - Parallel, sequential, or sequential PV modulation of burner/boiler firing rate
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- Remote enable and setpoint adjustment via BMS
  - Time or temperature based hot standby capability
  - Low temperature/low fire hold capability
  - System steam flow or MBTU totalization, based upon firing rate
  - The Master Panel shall communicate with either a local TS series touch screen at each boiler, local TS series serial communication kit for an LMV linkageless system, and/or an RWF55 at each boiler with a flame safe guard.
  - Forced lead boiler selection, which shall stop automatic boiler rotation
  - Forced lead boiler selection
  - Forced boiler not to be the lead boiler
  - Forced number of boilers in lead lag rotation
  - Forced individual boilers to lower fire, when boiler pressure exceeds setpoint plus an offset LFH
  - Hand-Off-Auto selection
  - Water level monitoring of local boilers via RWF55 loop controllers
  - Available override setpoint mode via a digital input
  - Selectable boiler setpoint, based on a predetermined daily schedule
  - Monitoring of individual boiler status and alarms
  - Automatic configuration of local boiler touch screen graphics, based on Master Panel selections
  - Monitored analog inputs and outputs shall be configured based on manual input values
  - Monitored digital outputs shall be configured based on the value in any of the Modbus registers and associated setpoints
  - Standard or Metric unit display
  - English or Spanish language option
  - Twelve (12) selectable data logging variables, stored in CSV format on a USB drive
  - Real time trending and data logging to a USB drive
  - Six (6) selectable variables for trending up to seven (7) days
  - Alarm history shall be stored for the most recent 250 alarms
  - Screen saver with process variable, setpoint, and demand
  - Ethernet and serial communications to local boilers, utilizing TS series touch screens or communication kits
  - Standard Modbus TCP/IP, or Modbus RTU, to BMS communications
  - Additional BMS communication options shall include BACNet/IP, BACNet MS/TP, Metasys N2, Ethernet/IP, Profibus, Profinet and LonWorks; via an external protocol translator
  - Email and text messaging of alarms and screen shots for up to six (6) recipients
  - Screen shot capture via USB
  - Remote monitoring capability via smart phone, tablet, and other mobile devices
  - Interface to DA/ST control panel
  - Short cut navigation from the overview screen on the HMI

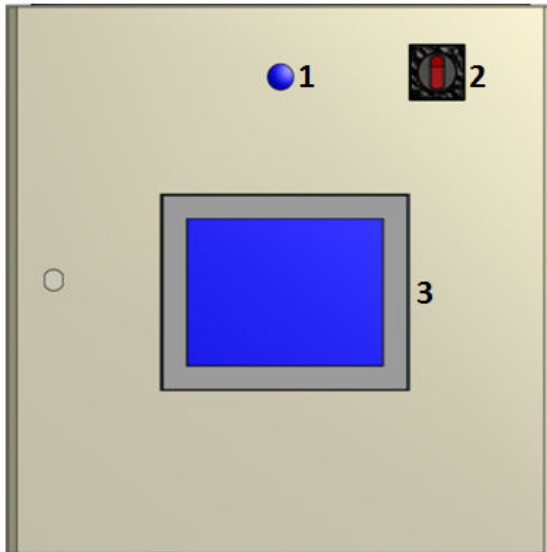
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- Multi-level, password protected screens
  - Four (4) analog inputs with field configurable label, span, and type; 0-10V, 2-10V, 0-20mA, or 4-20mA. Optional for hot water boilers
    - Each input shall be configured for low and high alarm setpoints, with auto or manual reset
    - Totalization is available per minute or per hour
  - Two (2) analog outputs with field configurable span and type; 0-10V, 2-10V, 0-20mA, or 4-20mA
    - Each output shall be configured for low and high alarm setpoints, with auto or manual reset
    - Optional with the analog input module selection for hot water boilers
  - Four (4) Pt100 or Pt1000 RTD temperature inputs with field configurable label, optional for steam boilers
    - Each input shall be configured for low and high alarm setpoints, with auto or manual reset
  - Four (4) digital outputs with field configurable logic, including ON and OFF delays
    - Manual or automatic reset
  - Outside air reset for hot water boilers
  - Individual circulating pump control outputs for hot water boilers
3. The Master Panel shall have the following operation:
- Operation of the Master Panel boiler lead/lag system shall be selectable for sequential or unison modulation
  - Individual boiler firing rates, pressure, and temperature shall be monitored
  - Based upon the lead boiler firing rate, the first lag boiler shall be placed online
    - Additional lag sequenced boilers shall be placed online based upon total output from all operating boilers
  - As total boiler output drops to a pre-determined setpoint, lag boilers will be taken offline and placed in standby, based upon programmed lag boiler sequencing
  - Sequence of boiler operation shall be selectable via the Master Panel HMI touch screen
  - Configurable boiler rotation shall be based on up to 999 hours
  - A centralized display of LMV parameters and RWF parameters of every boiler shall be available via the Master Panel HMI touch screen
  - Centralized alarm status for all boilers shall be available via the Master Panel HMI touch screen
  - The Master Panel lead/lag system shall apply to either hot water or steam boilers
  - A remote monitoring application shall be utilized to view the Master Panel screen shots via a local CAT5 connection to the internet or intranet
  - The Master Panel lead/lag system shall be capable of navigating through the local boiler touch screens to view and monitor all aspects of boiler operation, such as flame signal, system status, and parallel positioning information, as well as all temperature and pressure parameters
  - Alarm texting and emailing shall be integrated with external connections and shall provide fault and lockout indication of individual boilers and equipment
  - The Master Panel lead/lag system shall provide centralized totalization for all boiler flow meters when optional expanded I/O is utilized
  - If additional boilers are installed, the Master Panel lead/lag system shall not require any additional modules to be added in the field
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- The Master Panel lead/lag system shall operate with any combination of boilers utilizing LMV linkageless controls systems, without utilizing a touch screen on each boiler
  - If the optional temperature sensor is installed on steam boilers, the Master Panel lead/lag system shall perform a low fire hold based upon temperature
  
  - If a temperature sensor is installed on steam boilers, the Master Panel lead/lag system shall modulate to maintain a preset adjustable pressure or temperature setpoint
  - The Master Panel lead/lag system shall be capable of performing a hot standby routine to cycle connected boilers ON and OFF
4. The Master Panel lead/lag HMI touch screen shall be available in 7 inch, 10.4 inch, or 12.1 inch sizes. They shall provide the following operator interface information and selections:
- Monitoring of all LMV5 system parameters at each boiler shall include, but not be limited to:
    - Boiler related alarm messaging and logging in plain text English or Spanish
    - Steam or temperature actual value
    - Steam or temperature setpoint
    - Flame signal strength
    - Firing rate
    - Actuator position
    - VFD speed, if connected
    - VFD power consumption, if connected
    - O<sub>2</sub> concentration, if connected
    - Stack and ambient temperatures, if connected
    - Burner status and alarm status
    - Drum level control, if connected with RWF55
    - Economizer stack inlet and outlet temperatures, if connected
    - Economizer feedwater inlet and outlet temperatures, if connected
    - Feedwater flow and fuel flows, if connected
  - Adjustment of operation and burner/boiler parameters shall include:
    - Boiler pressure/temperature setpoint
    - Master Panel pressure/temperature setpoint
    - Boiler automatic/manual operation, set firing rate in manual
    - Sequence of rotation in multi-boiler lead/lag configuration
    - Timing of lead boiler rotation
  - Optional monitoring shall be available for the deaerator feedwater tank, surge tank, and/or stack economizer
5. Failure of any component within the Master Panel will not result in a loss of boiler operation. Operation will revert to local PID control, located in the RWF10/RWF55/LMV5, utilizing a pre-programmed local setpoint. Hydronic pump outputs, if used, will fail to the ON condition.

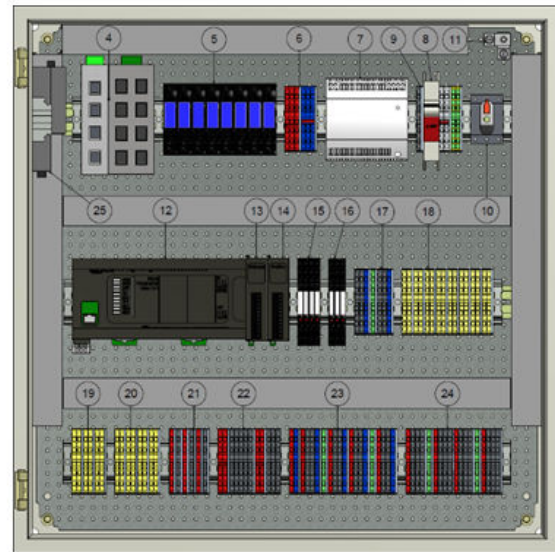
## **Dimensions**

For dimensions, reference TS-2000 data sheet.

## Parts Description



Front



Back Panel

1	24 VDC PLC normal indicator light
2	Main 120 VAC lockable disconnect handle
3	7 inch, 10.4 inch, or 12.1 inch touch screen
4	Ethernet switch, number of ports dependent upon product part number
5	Circulating pump and isolation valve output relays *only if circulating pump controls option (Y) is selected for hot water boilers; applications H, W, or Z
6	24 VDC enclosure terminals
7	24 VDC power supply
8	Circuit breaker
9	120 VAC power terminals
10	120 VAC main disconnect with UL lock
11	Ground lugs
12	Programmable logic controller (PLC)
13	Analog input module *standard for application S, R, or U *included if analog option (A) is selected for hot water boilers; applications H, W, or Z
14	RTD input module *standard for hot water boilers; applications H, W, or Z *included if RTD option (T) is selected for steam boilers; applications S, R, or U
15	Monitored value, discrete output relays
16	General and analog high/low alarm relays
17	Analog output field terminals

18	Circulating pumps control field terminals *standard for hot water boilers only; applications H, W, or Z
19	General, PLC normal, high, and low analog input alarm field terminals
20	Monitored value, discrete output field terminals
21	Override, remote set point, and remote disable field terminals
22	Circulating pump proven field terminals for hot water boilers only; applications H, W, or Z
23	Analog input field terminals *standard for steam boilers; applications S, R, or U *included if analog option (A) is selected for hot water boilers; applications H, W, or Z
24	RTD input field terminals *standard for hot water boilers; applications H, W, or Z *optional for steam boilers; applications S, R, or U
25	BMS interface module for communications other than Modbus; applications B, M, or L

\* : Reference TS-2000 data sheet for various Master Panel part numbers and part descriptions

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