I. GENERAL CONTRACTOR'S RESPONSIBILITIES:

a. Read Philips Teletrol (TSI) / Dollar Tree (DT) Documentation Package.
b. Review all DT drawings.
c. Contractor will contact the store manager immediately upon arriving onsite to:
   i. Confirm permission to begin EMS installation
   ii. Offer a brief overview of the installation process
   iii. Serve as the TSI point of contact for the manager and to help resolve all issues or questions that arise during the installation process.
d. Confirm TSI Survey Form is completed and EMAILED to TSI National Account Team at Teletrol.surveys@philips.com or FAXED to (855) 224-0879.
e. Schedule remote EMS commissioning 24 hours prior to the requested commissioning date. Contact Philips Teletrol Inc. at (615) 495-1963 and submit survey for scheduling remote EMS commissioning.

II. ELECTRICAL RESPONSIBILITIES:

Power to all EMS equipment and devices must be OFF while terminations are made.

a. Provide all labor and installation material, as required, for a complete and operational EMS for this DT store location.
b. Receive and store all TSI material in a dry and secure place until the EMS installation is completed.
c. The EMS equipment will be supplied by TSI and installed by an approved TSI contractor.
d. Review the entire set of plans, perform a job site survey and inventory the TSI equipment to ensure the proper equipment has been ordered and received for a complete and operational TSI EMS.
e. If any material is missing or additional equipment is required, immediately call TSI at (615) 495- 1963 to request an order.
f. Approved Contractor shall verify number of controlled lighting circuits against the design, report discrepancies, which cannot be resolved in the field, to the TSI National Account Support Team at (615) 495-1963 and wait for resolution instructions.
g. Coordinate the EMS installation with the Mechanical Contractor to avoid any interference that may delay progress during construction.
h. Perform all work in accordance with all National, State and Local Codes for this project.
i. All EMS cables are to be installed per National and Local Codes. It is the Electrical Contractor's responsibility to determine if National and Local Codes permit Class 2 cables to be installed exposed within the building structure or if a full conduit system is required.
j. EMT connectors and bushings are to be installed at the top of every conduit sleeve and threaded connector to protect EMS cables from abrasions.
k. All cables are to be clearly and distinctly labeled within one foot of both ends.
l. Furnish and install all required conduit, boxes, wire ways, fittings, straps, hangers and wiring for a complete and operational EMS as required.
m. Furnish and install a dedicated 120 VAC circuit with breaker lock for the EMS Panel.
   i. Label breaker: DO NOT TURN OFF / EMS
   ii. Confirm wiring is completed as per this documentation package before applying power. Improper wiring will cause damage to equipment.
n. Mount the EMS Panel adjacent to the electrical panels.
o. Install an Ethernet cable run from the eSC RJ-45 jack located in the EMS Panel to the network switch specified by the DT networking team.
p. Install and terminate the TSI BACnet communication trunk in a daisy chain fashion from the EMS Panel to each of the Thermostat Controls. (see this documentation package for requirements)
q. When applicable, mount the Auxiliary I/O Panel adjacent to the EMS Panel and ensure both panels are connected to the same Earth Ground.
r. Mount and terminate the Outdoor Sensor Assembly (OSA) on the north/northeast side of the building. When installing, make sure enclosure is:
   i. Weather-proofed
   ii. Mounted with the white PVC sensor pointed downward
   iii. Not mounted on any removable access door or HVAC Unit.
   iv. Positioned to allow the Outdoor Light Sensor exposure to full ambient daylight but is not shadowed or exposed to any artificial illumination.
s. When applicable, mount and terminate the CO2 Sensor as per the location specified by the DT drawings and this documentation package.
t. Mount and terminate the Override Button assembly as per the location specified by the DT drawings and this documentation package.
u. Mount and terminate the Indoor Ambient Light Sensor(s) as per the location specified by the DT drawings and the Special Instructions in this documentation package.
v. Install and wire coil and load sides of lighting contactors for designated lighting loads as required by DT and this documentation package.
w. Furnish and install a 3-pole, 20 amp breaker/disconnect at the Main Distribution Panel (MDP) for each Phase Loss Power Monitor.
x. Terminate wiring as specified in this documentation package.
   i. Label each breaker/disconnect: DO NOT TURN OFF / PHASE FAILURE
   ii. Confirm wiring is completed as per this documentation package before applying power. Improper wiring will cause damage to equipment.
y. Verify Input Jumpers are correctly set. For this install:
   i. Input jumpers 1 – 4, 6 and 8 should be configured as Thermistor Inputs
      T
   ii. Input jumpers 5 and 7 should be configured as Voltage Inputs
      V
z. Provide a technician, on site, for an approximate 2-hour remote telephone checkout with TSI.
aa. Coordinate with the Mechanical Contractor to verify HVAC control during the TSI remote telephone checkout.
bb. Upon completion of the installation and prior to scheduling the Remote Commissioning Checkout, the Electrical Contractor will:
   i. Fill in the forms below and fax then to TSI at (855) 224-0879.
   ii. Confirm the Mechanical Contractor will be present during the TSI Remote Commissioning Checkout.
   iii. Contact TSI to schedule a remote checkout at (615) 495-1963.

III. MECHANICAL RESPONSIBILITIES:

Power to all EMS equipment and devices must be OFF while terminations are made.

a. Provide labor and installation material, as required, for a complete and operational EMS for this DT store location.
b. Verify number and type of HVAC units and unit heaters against the design, report discrepancies, which cannot be resolved in the field, to the TSI National Account Support Team at (615) 495-1963 and wait for resolution instructions.
c. Perform all work in accordance with all National, State and Local Codes for this project.
d. Mount and terminate the SimpleSTAT module(s) as per the location(s) specified by the DT drawings and this documentation package.
e. Utilizing 18/8 cable between the SimpleSTAT module and HVAC unit.
   i. Terminate C, R, G, Y1, Y2, W1 and W2 on the HVAC unit for control of fan, cooling and heating.
   ii. Terminate the communications cables to the SimpleSTAT(S) as shown in this documentation package.
f. Set address on the SimpleSTAT module, as shown in the SimpleSTAT installation instructions. When communications to the eSC is in a failed state, the SimpleSTAT will operate 24/7 as a stand-alone STAT using the following temperature setpoints:
   i. Default Cooling Setpoint = 72.0 °F
   ii. Default Heating Setpoint = 68.0 °F
g. Mount and terminate the Remote Space Temperature Sensor(s) as per the location(s) specified by the DT drawings and the Special Instructions in this documentation package.
   i. In close proximity to the zone return air grille and away from supply air diffusers.
   ii. Install and secure the Remote Temperature Sensor wire to the Thermostat Controller.
h. Mount the remote Supply Duct Temperature sensor of each HVAC unit in the main Supply Air Duct at the interior side of the HVAC unit's building penetration.
   i. The remote Supply Duct Temperature Sensor should be mounted in the main Supply Air Duct at the interior side of the HVAC unit's building penetration.
   ii. Utilizing 18/2 wire, terminate the supply duct temperature sensor wire to the Thermostat module as shown in this documentation package.
i. Provide Electrical Contractor with roof plan layout, showing location of HVAC Units on the roof.
j. Provide a technician, on site, for an approximate 2-hour remote telephone checkout with TSI.
k. Coordinate with the Electrical Contractor to verify proper HVAC control during the TSI remote Commissioning Checkout.

IV. PHILIPS TELETROL RESPONSIBILITIES:

a. The following services will be supplied by TSI:
   i. Shipping of all selected EMS components for the project.
   ii. Programming and downloading of TSI equipment and software.
   iii. Provide telephone technical support at (615) 495-1963.
   iv. Remote system checkout with installing contractor.
b. Verification of proper operation of the following by exercising the controlled load:
   i. Time operation of all applicable EMS lighting loads – Interior and Exterior.
   ii. Provide light level control of all applicable EMS lighting loads – Interior and Exterior.
   iii. Verification of HVAC heating stages, as indoor environment allows.
   iv. Verification of HVAC cooling stages, as indoor and outdoor environments allow.
   v. Verification of HVAC unit sensor readings – space and supply temperatures.
c. If the end unit (i.e. lighting, HVAC unit, supply air fan, unit heater, etc.) cannot be operated for mechanical or electrical reasons, TSI will verify the proper operation of the control devices (e.g. contactors, dischargers, I/O) leading up to the unit.

V. PHILIPS TELETROL SPECIAL INSTRUCTIONS:

Demand Controlled Ventilation (DCV) Setup:

a. The Mechanical Contractor and Air Balancer will need to use this procedure to adjust the:
   - Minimum Outside Air (OA) damper position
   - DCV Maximum damper position
   - DCV Setpoint potentiometers
b. This checkout procedure is intended for use with the following pieces of required hardware and test equipment:
   - Carrier HVAC unit, with W7212 Economizer Controller (HH63AW001)
   - Five jumper wires
   - 9 volt battery
   - Multimeter
   - Small flat blade screwdriver
c. This test procedure verifies that the HVAC unit OA damper will modulate between the reduced and standard minimum OA CFM quantity based on the 0-10 vdc signal from the CO2 sensor.
d. Whenever the Space CO2 level is below setpoint (1000 ppm) the HVAC system will maintain the minimum OA CFM. When the Space CO2 level exceeds the CO2 setpoint the HVAC system will increase to the maximum OA CFM until the Space CO2 level recovers.

Note: *Refer to mechanical drawings for minimum and maximum OA CFM values.*

e. Step #1 - Preliminary Setup and Checkout of the Carrier Economizer Controller CO2/DCV system operation
   i. Disconnect power to the rooftop unit.
   ii. Locate the Carrier Economizer Controller (HH63AW001) and complete the following steps:
      1. If the OA temperature is below 55° F, install a jumper between terminal T & T1.
      2. Set the Minimum Position and DCV Setpoint potentiometers fully CCW (counterclockwise).
      3. Set the DCV Maximum Position potentiometer fully CW (clockwise).
      4. Set the Enthalpy potentiometer to D.
   iii. Prior to removing any existing CO2 sensor wires from terminals AQ & AQ1, record the following:
      1. Terminal voltage.
      2. Wire color code
      3. Wiring polarity

Note: *The voltage should be between 2 - 6 vdc. If the measured voltage is outside that range, troubleshoot for CO2 sensor problems.*

   iv. Remove wires located on terminals AQ & AQ1.
   v. Apply power to the HVAC unit. Allow approximately 3 minutes for the HVAC unit to complete its start-up process. The dampers should be closed and the DCV LED should be off.
   vi. Return to the Carrier Economizer Controller (HH63AW001) and complete the following steps:
      1. Install a jumper wire from the AQ terminal to the 9 volt battery (negative) female post.
      2. Install a jumper wire from the AQ1 terminal to the 9 volt battery (positive) male post. The LED for DCV should turn on and the damper should modulate to 95% open.
      3. Turn the DCV setpoint potentiometer CW until the DCV LED turns off. The damper should drive to the reduce minimum OA CFM position.
f. Step #2 - Air Balancer Setup of the Carrier Economizer Controller CO2/DCV system, Min Pos, DCV Setpoint, and DCV Max potentiometers. With test conditions setup as defined in items above, complete the following steps:
   i. Adjust the DCV Setpoint potentiometer to the 11 o'clock position; this equates to a CO2 level of approximately 1000 ppm.
   ii. Verify the jumper wire from AQ terminal to the (positive) male post of the 9 volt battery is disconnected from the battery male post. The DCV LED should be off.
   iii. Adjust the Min Pos pot to 95% of the minimum OA CFM value as noted on the mechanical equipment schedule for that HVAC unit.
   iv. Connect the jumper wire from the AQ terminal to the (positive) male post of the 9 volt battery. The DCV LED should be on.
   v. Adjust the DCV Max pot to 100% of the minimum OA CFM value as noted on the mechanical equipment schedule for that rooftop unit.
   vi. Using a marker pen, indicate the proper settings for the Min Pos, DCV Setpoint, and DCV Max potentiometers.
g. Disconnect power to the HVAC unit, remove all five jumper wires and reinstall the CO2 sensor wires to terminals AQ & AQ1 as originally configured.
h. Apply power to the HVAC unit and verify that the HVAC unit completes its start-up process.

Indoor Light Sensor (ILS) Installation:

a. Each Indoor Light Sensor(s) shall be mounted with a 2x4 electrical box provided by the Electrical Contractor.
b. Each Indoor Light Sensor(s) shall be mounted with the Downrod Assembly provided by TSI.
c. Each Indoor Light Sensor(s) shall be not mounted any higher than 7'AFF.
d. Each Indoor Light Sensor(s) shall be mounted so that the sensor eye is facing the front of the store.
e. A Single 18/4/Shielded Plenum Cable or Two 18/2/Shielded Plenum Cables shall be used for connection of each Indoor Light Sensor(s) to the EMS Panel or Auxiliary I/O Panel.
f. Refer to the electrical plans and DT Drawings for correct sensor placement.

DEVICE LEGEND

SYMBOL	DESCRIPTION
SSC	HVAC UNIT CONTROLLER (SIMPLESTAT)
TRC	HVAC UNIT CONTROLLER (TRC)
DTS	DUCT TEMPERATURE SENSOR
STS	SPACE TEMPERATURE SENSOR
OLS	OUTDOOR LIGHT SENSOR
OHS / OTS	OUTDOOR TEMPERATURE & RELATIVE HUMIDITY SENSORS
RTP	REMOTE TEMPERATURE PROBE
CO_2S	INDOOR CO_2 SENSOR
IHS	INDOOR RELATIVE HUMIDITY SENSOR
DOOR SENSOR	O/H DOOR SENSOR
DOOR SENSOR	MAN DOOR SENSOR
SECURITY INTERFACE DEVICE	SECURITY INTERFACE DEVICE
eSC	eBUILDING SYSTEM CONTROLLER
ROS	REMOTE OVERRIDE SWITCH

CABLE LEGEND

KEY	SIZE	TYPE	MFG.	MFG. PART #
10	18/2	SHIELDED, PLENUM	WINDY CITY	# 002320-S
12	18/4	SHIELDED, PLENUM	WINDY CITY	# 002340-S
14	18/8	NON SHIELDED, PLENUM	WINDY CITY	# 002392-S
16	18/10	NON SHIELDED, PLENUM	WINDY CITY	# 002393-S
18	24/8	CAT5 E, PLENUM	WINDY CITY	# 5556140-S

WIRING LEGEND

- FIELD WIRING
- POSITIVE
- NEGATIVE
- OPTIONAL COMPONENT

TELETROL SYSTEMS INC.
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Manchester, NH 03101

PHILIPS teletrol — sense and simplify

DOLLAR TREE DRAWING NOTES (FOR REFERENCE ONLY)

REVISION: (PART NUMBER 94-327)	DATE:
ADD NEW CONTROLLER TO DESIGN (ECN 2167)	4/11/14
Add interconnection information for Auxiliary I/O panel, 01-451 (ECN 2234)	7/15/14
ADD ANTUMBRA OPTION (ECN 2239)	8/14/14
DRAWN:	CHECKED:
W.P.C.	R.S.R.

ENERGY MANAGEMENT PLAN

EM-1 of 4

WWW.DILine.COM
Other Plans @ www.