

# **TUCOR RKD CONTROL SYSTEM SPECIFICATIONS**

The Automatic Irrigation System Controls shall be the RKD Control System as manufactured by Tucor, Inc. of Wexford, Pennsylvania and hereinafter specified.

The RKD Control System shall be comprised of the Tucor RKD Controller, RKLD050 Programmable Decoders, Tucor #16/2 Communication Cable, Tucor SP-100 Line Surge Protectors, Tucor HCP-100 Portable Decoder Programmer (Optional) and all other equipment required for a complete system.

## **RKD CONTROLLER**

The Tucor RKD Controller shall be a standalone controller capable of operating one hundred 24VAC solenoid valves along a two-wire path. The controller shall be capable of simultaneously operating ten valves, one master valve, one cut-off valve, and two booster pumps from the two-wire path. The controller shall be capable of operating a single valve connected to the two-wire path up to 11100 feet away using #16/2 Tucor communication cable.

The RKD shall have a locking metal NEMA-rated cabinet with internal transformer requiring 120 VAC electrical input and 24 VAC output. Two-wire path output from the controller shall be 34 VAC. The controller shall have built-in lightning protection.

The RKD shall have ten independent programs plus one test program. Programs shall run concurrently with six start times per program over a fourteen-day calendar. Station run times shall be adjustable from 0-999 minutes in one-minute increments. Stations will operate in sequence from 1 – 100. The controller shall have a water budget feature that will adjust the water budget of each program independently from 0-250% in one percent increments. Programs shall have both active and passive modes.

The controller shall have the capability to start programs and stations automatically or manually. Manual start of programs and/or stations shall be accomplished without the need to pause or cancel currently running programs.

The RKD shall have a backlit display with contrast adjustment. The display shall be capable of showing the operating status of the system. Active programs, run times and the current time shall be displayed. The controller shall have an option to monitor and display the electrical conditions of the two-wire path including current (in milliamps) and voltage.

The controller shall have built in diagnostics that will test for station individual station operation, decoder pass/fail and electrical shorts in the two-wire path.

The RKD shall be capable of operating two booster pumps. Booster operation shall be assignable to individual programs. Valve output power shall be adjustable through menu options that allow for four different power levels.

The controller shall have separate terminals for connection to a rain sensor, alarm and ET input. ET input shall be provided by an optional Weather Reach WR-7RKD or Davis ET-300 weather sensor.

The controller shall include a special circuit for monitoring, on a continuous basis, the line voltage condition. In the event of an electrical short, the controller will automatically switch to 50 Hz mode at reduced current.

The controller shall have the ability to monitor and display water flow conditions with an optional Data Industrial Flow Meter. The Flow Meter inputs shall be directly connected to the RKD via separate terminals.

The controller shall have the ability to enable a Cut-Off Valve using an RKLD050 decoder in the event of an unexpected flow condition.

The controller shall also have terminals for connection of decoders for the purpose of programming, reprogramming and testing decoders.

The optional HCP-100 hand programmer shall have the same decoder programming capabilities as the RKD controller.

Install the RKD controller in accordance with local electrical codes and with a proper electrical ground. The controller should be mounted in an easily accessible location and at a height that allows convenient operation of controls.

## **LINE DECODERS**

RKLD050 decoders shall provide the interface between the 24 VAC valves and the two-wire communication from the RKD controller.

RKLD050 decoders shall be shipped in a “blank” state with no programming information. For programming, decoders shall be connected to the RKD controller decoder terminals and programmed with the desired station address. Decoders shall be programmable as station numbers one through one hundred (“ST1” through “ST00”), master valve (“MV), Cut-Off Valve (COV), booster pump #1 (“BO1”) or booster pump #2 (“BO2”). Decoders shall have the ability to be reprogrammed to other station addresses. The controller shall have a decoder test function that will give a decoder pass/fail test result.

Each decoder shall be epoxy sealed and completely waterproof.

The decoder shall have two (2) blue colored wires for connection to the two-wire path communication path and two (2) white colored wires for connection to the valve solenoid wires.

Each decoder shall be labeled with the station address that was programmed into it. A programmed decoder shall be installed with the valve that corresponds to the programmed station number. In most cases, the decoder shall be installed in the same valve box as the valve it operates. For remote installation, the decoder to valve distance shall not exceed 150 feet using #14 wire.

Each RKLD050 decoder shall be capable of operating one valve solenoid.

**THE LOCATION OF EACH DECODER SHALL BE MARKED ON THE AS-BUILT PLANS.**

### **TWO-WIRE PATH**

All wire used for communication between the RKD controller and the RKLD050 decoders shall be double-jacketed, two (2) conductor cable specifically designed for use with Tucor control systems. The cable shall be suitable for direct burial, or for installation in ducts or conduits.

The conductors shall be #16 AWG tin-coated, soft drawn, annealed, solid copper conforming to ASTM 33 with 4/64" thick PVC (polyvinyl chloride) insulation, conforming to UL Standard #493 for thermoplastic insulated style UF (Underground Feeder), rated at 60 degrees C.

The two insulated conductors shall be laid parallel and encased in a single outer jacket of 3/64" thick, high density, sunlight resistant polyethylene conforming to ICEA S-61-402 and NEMA WC5, having a minimum wall thickness of 0.045". The outer jacket shall be pressure extruded so as to completely fill the interstices between the two insulated wires, or may have tube jacketing or form an envelope over the two insulated UF conductors lying in parallel, at the discretion of the manufacturer.

The two conductors shall be color coded with one conductor black and the other red. Both conductors shall be the SAME SIZE.

All splices and connections in this wiring shall be made using the waterproof splice connectors provided with the RKLD050 decoder. 3M DBY wire connector kits may also be used. Any other type of wire connector will NOT be accepted. Care shall be taken with each wire connection to assure a tight, waterproof connection. **IT IS ESSENTIAL THAT ALL CONNECTIONS BE ABSOLUTELY WATERTIGHT WITH NO LEAKAGE TO GROUND NOR SHORTING BETWEEN CONDUCTORS.**

## **SURGE PROTECTION**

All surge protection, grounding and installation of equipment specified, shall be installed in strict compliance with the manufacturer's recommendations and in accordance with Local, State and Federal requirements.

### **Primary Power Surge Protection:**

Furnish and install surge protection on the power circuit that will supply power to the controller.

### **Field Surge Protection:**

SP-100 surge protectors shall be installed at every line termination point. Additional SP-100's shall be installed at every 600-foot interval along the two-wire path, located at the nearest line decoder, and also at the end of each two-wire path. Connect SP-100 ground wires to a single 8-foot ground rod. If the valve is metallic or the solenoid has a metallic center pin, one of the SP-100 ground wires shall be connected to it.

All SP-100 ground rod assemblies shall be installed in valve boxes. Mark the location of all ground points on the as-built plans.

All grounds shall be tested for earth-to-ground resistance. Readings of 50 Ohms or less are acceptable. Resistance readings of 50 Ohms or greater shall necessitate the installation of additional grounding materials to reduce the ground resistance to acceptable levels.