

1 GENERAL

1.1 RELATED WORK

- .1 Basic Electrical Materials and Methods Section 26 05 01
- .2 Fastenings and Supports Section 26 05 29
- .3 Programmable Logic Controller Section 40 20 00

1.2 SCOPE

- .1 This section covers the supply and installation of all field located motor control stations and control panels.

1.3 QUALITY ASSURANCE

- .1 Control equipment to CSA C22.2 No. 14-M1987

1.4 SUBMITTALS

- .1 Submit shop drawings in accordance with Section 40 05 00 and include schematic wiring diagrams and mounting information.

2 PRODUCTS

2.1 OPERATOR CONTROL STATIONS

- .1 All enclosures and devices shall be rated EEMAC 12 in non-hazardous environments, EEMAC 3R in outdoor environments or EEMAC 7 in hazardous environments unless otherwise noted.

2.2 PUSHBUTTONS

- .1 Heavy duty oiltight, operator flush, black with 1-NC and 1-NO contacts rated at 10A, 120VAC, labels as indicated. Stop pushbuttons coloured red, provision for padlocking in depressed position.
- .2 Acceptable manufacturer shall be Telemecanique, Allen-Bradley.

2.3 INDICATING LIGHTS

- .1 Heavy duty oiltight, push to test LED type, lens colour as indicated, supply voltage as required, labels as indicated.
- .2 Acceptable manufacturer shall be Telemecanique, Allen-Bradley.

2.4 SELECTOR SWITCHES

- .1 Number of positions as required, labelled as indicated, heavy duty oiltight, operators as indicated, contact arrangements as indicated, rated 120VAC, 10A.
- .2 Acceptable manufacturer shall be Telemecanique, Allen-Bradley

2.5 CONTROL RELAYS

- .1 Number of poles as required, must be double throw type.
- .2 Removable relay cube from base
- .3 Acceptable manufacturer shall be Omron, Weidmuller

2.6 DC POWER SUPPLIES

- .1 Wattage as required by connected load plus minimum 50% spare capacity.
- .2 Acceptable manufacturer shall be Omron, Weidmuller

2.7 TERMINALS

- .1 Provide Weidmuller "W" series terminals, number indicated plus 20% spare
- .2 Terminals to be rated for connected load
- .3 Double stack terminals will not be permitted unless written approval is obtained from the Contract Administrator.

2.8 INDUSTRIAL ETHERNET SWITCH

- .1 Provide one Industrial Ethernet switch for communication to all process equipment control panels.
- .2 Ethernet switch to have sufficient ports to connect all communicating equipment and control panels, programming access point plus 20% spare ports.
- .3 Industrial Ethernet managed switch as indicated. Acceptable manufacturer shall be Moxa EDS series, N-Tron #7000 series or approved equal in accordance with B.7.

2.9 GENERAL

- .1 Supply the control panels in accordance with the general arrangement and dimensions indicated on the appropriate drawings. Panels must be complete with all instruments, meters, switches, indicating lights, relays, etc. as specified herein or as indicated.
- .2 Provide removable lamacoid nameplates having letters not smaller than 6mm to identify equipment.

2.10 CONSTRUCTION

- .1 Minimum EEMAC 12 construction for all panels unless otherwise specified.
- .2 Unless otherwise specified fabricate floor mounted panels of high grade, cold rolled smooth sheet metal steel no thinner than 3mm thick with all doors and edges neatly turned and finished smoothly. Visible welding seams will not be accepted.
- .3 Construct rigid panels and racks with an angle iron or channel supporting frame, suitable braced and stiffened to prevent any deformation during shipping or installation, and provide a surface free from dents, warping or other deformation. Provide a four-sided channel iron mounting base with front recess.
- .4 Provide flush fitting, gasketed doors, hung on piano type hinges with three point latches and locking type handles. (CSA Type 12 construction).
- .5 Provide pans and rails for mounting terminal blocks, relays, wiring and other necessary devices.
- .6 Use rear connected fittings to hold equipment and instrument cases on the panel, but where not possible, any front fixing required shall be only by means of chrome-plated, brass or stainless steel machine screws.
- .7 Panel surfaces shall be thoroughly cleaned and degreased before painting. One primer coat shall be covered by two finished paint coats.
- .8 The surface finish shall be free of runs, drips, ridges, waves and laps. The paints shall be applied in such manner as to provide an even film covering corners and crevices. The interior finish shall be white and the exterior finish shall be grey.
- .9 Panel accessories: A pocket, 250mm wide x 150mm high x 25mm deep to hold pertinent drawings and manuals on the lower half of the inside door.

2.11 INTERNAL WORKS

- .1 Provide an individual switch for disconnection and a fuse for isolation of all panel mounted instruments requiring a 120VAC supply
- .2 Make all wiring connections in the shop from the equipment mounted on the panel to numbered terminal blocks conveniently located in the panel, including the power supply for all instruments. Conductors shall be extra flexible stranded copper of gauges sufficient to carry the required currents and shall in no case be smaller than #16 AWG extra flexible.
- .3 Identify all wiring by means of plastic slip-on type or thermally printed heat-shrink type markers. Install all wiring neatly and laced or bunched into cable from using plastic wire clips, and where practical, contained in plastic wiring channels with

covers. Provide wire gutter divider to ensure analog signal wiring is kept separate from digital signal or power wiring as appropriate.

- .4 Each terminal shall be clearly indelibly marked with the wire number connection to it. Each field connecting conductor shall be served by one terminal. Provide 20% spare unit terminals. Provide all necessary terminal block accessories such as manufactured jumpers and marking tape.
- .5 Mount all internally mounted equipment on DIN rail or mount on a rack and arrange for ease of access and removal when necessary.
- .6 Arrange all terminal blocks in the panel in groups such that all low level signals such as 4-20mA DC are located in one area, followed by contact closure type signals (limit switches, etc.) that do not subsequently energize starters, etc. but are for status indication, and the remainder that contain powered circuits are to be arranged in such a manner and location so as to prevent interference into the low level signal.
- .7 Submit proposed terminal block layout and identification scheme for review prior to manufacture.
- .8 Provide suitable space around the terminal blocks for incoming and outgoing conductors or cable assemblies, with a minimum of 5cm between terminals and wire trough.
- .9 Provide plastic cable troughs equal to Panduit (in accordance with B.7) complete with snap-on covers for containing the cables. Cables are not to be bunched and tied, but laid in.

2.12 PANEL MANUFACTURER

- .1 Panel assembly, subcomponents and all internal components shall be CSA approved. Cabinet construction shall be performed by an established panel manufacturer who shall comply with all building codes, factory, and Department of Labour regulations and has CSA approval as manufacturer for all components of the work including control panels, service entrance, etc. Local approvals for panel construction including CSA will not be accepted.
- .2 Acceptable panel manufacturer shall be Celco Controls Ltd, Manco Control Systems Inc, Tri-Star Automation, Indus Automation, 3 Phase Power Systems.

2.13 MAIN CONTROL PANEL

- .1 Control panel to contain all items indicated on the drawings including:
 - .1 EEMAC 12 rated pad mounted stand alone enclosure, 12 gauge, c/w hinged lockable doors.
 - .2 Terminal strips (identified) for all wiring

- .3 Identification nameplates on all components, interior and exterior
 - .4 Extra flexible wire to door components
 - .5 Circuit breakers and/or fuses as required
 - .6 Transient Voltage Surge Suppressor
 - .7 UPS as specified in Section 26 33 53
 - .8 DC power supply
 - .9 PLC c/w digital/analog input/output expansion cards needed to connect various equipment, sensors, etc. as specified in Section 40 20 00.
 - .10 HMI screen: Schneider 10.4" GTO Magelis Panel.
 - .11 Ethernet switch as specified in Section 40 10 00
 - .12 City of Winnipeg to supply cellular auto-dialler for inclusion in RTU panel.
 - .13 Land line alarm auto-dialler as backup for the City of Winnipeg supplied cellular autodialler.
 - .14 Panel finish shall be white epoxy paint for interior and ASA 61 light grey enamel for exterior.
- .2 Pump Control Narrative:
- .1 Existing flood pumps to be started based on level in the wet well.
 - .1 LP-1 to start at user selectable level and turn off once user selectable stop level is reached.
 - .2 If level continues to rise, LP-2 to start at user selectable level and both turn off once user selectable stop level is reached.
 - .3 If level still continues to rise, LP-3 to start at user selectable level and all three turn off once user selectable stop level is reached.
 - .2 Provide user selectable high level alarm.
 - .3 Solenoid valves SV-1,2,3 control pump seal water and shall open upon call for pump start. If flow switches FS-1,2,3 do not register

flow within 10 seconds of pumps running, set seal water failure alarm. Pumps shall continue to run.

- .4 All alarms shall have user selectable priority levels.
 - .1 Level 1 to record alarm and initiate alarm dial out
 - .2 Level 2 to record alarm only

.3 HVAC Control Narrative:

- .1 Refer to Section 25 09 33

2.14 SF-1 CONTROL PANEL

- .1 Control panel to contain all items indicated on the drawings including:
 - .1 EEMAC 12 rated wall mounted enclosure, 12 gauge, c/w hinged lockable doors.
 - .2 Terminal strips (identified) for all wiring
 - .3 Identification nameplates on all components, interior and exterior
 - .4 Extra flexible wire to door components
 - .5 Circuit breakers and/or fuses as required
 - .6 Panel finish shall be white epoxy paint for interior and ASA 61 light grey enamel for exterior.
 - .7 Refer to Section 25 09 33 for control narrative.

2.15 EF-1 CONTROL PANEL

- .1 Control panel to contain all items indicated on the drawings including:
 - .1 EEMAC 7 rated wall mounted enclosure and EEMAC 7 rated disconnect, selector switches, indicator lights, etc.
 - .2 Terminal strips (identified) for all wiring
 - .3 Identification nameplates on all components, interior and exterior
 - .4 Extra flexible wire to door components
 - .5 Circuit breakers and/or fuses as required
 - .6 Refer to Section 25 09 33 for control narrative.

3 EXECUTION

3.1 INSTALLATION

- .1 Install pushbutton stations, control and relay panels, control devices as indicated and interconnect as indicated.

3.2 TESTS

- .1 Perform tests in accordance with Sections 26 00 05 and 40 00 05.
- .2 Depending upon magnitude and complexity, divide control system into convenient sections, energize one section at a time and check out operation of section.
- .3 Upon completion of sectional test, undertake group testing.
- .4 Check out complete system for operational sequencing.
- .5 Submit one copy of test results to the Contract Administrator.

3.3 START-UP AND COMMISSIONING

- .1 Perform all panel start-up and commissioning in accordance with Section 40 00 05.

END OF SECTION