Instruction Manual For 20 Way (DC) Sequential Timer

MODEL: mps1 WD-20 #2

Customer: RIECO INDUSTRIES LTD
Project: DE SYSTEM - MALYSIA

Reference:
RIECO ITEM CODE No.0042239902 (18 OUTPUT),
RIECO P.O. No. 151493 Dt. 13-07-2005

INLAND SYSTEMS
26, `VIDYESH' SENADUTTA PETH,
PUNE- 411041 (INDIA)
Phone: 020-24338284,24392381,56225242
Fax: 020-24336419
E-mail: xcalibur@eth.net

PDF created with pdfFactory Pro trial version www.pdffactory.com

Inland Systems
26, "VIDYESH", SENADUTTA PETH,
PUNE - 411 030. (MAHARASHTRA)
INDIA. E-mail: xcalibur@eth.net
PHONE : 020 -24338284
24392381, 56225242
FAX. No.:020 –24336419

Contents:

Sr. No.	Topic	Page No.
Section 1.	Introduction & Features	3
Section 2.	Operation	4
Section 3.	Optimizing the Cleaning Cycle	5
Section 4.	Installation and Wiring	6
Section 5.	Connection Description - Main PCB	6,7 & 8
Section 6.	Connection Description	8
Section 7.	Description	9
Section 8.	Technical specifications	10
Section 9.	Wiring diagram	11

PDF created with pdfFactory Pro trial version www.pdffactory.com

Section 1

Introduction:

The bag filter is one of the most effective and efficient pollution control equipment and the sequential timer can be used to maximize its performance. The efficiency and reliability of bag filter, longer bag life, lower consumption of electrical power and economical usage of compressed air can be achieved only with the help of fine-tuning of the cleaning cycle. At same time the timer has got ability to monitor the functionality of Pulse Solenoid Valve in the form of annunciation system to point defective operation. The sequential timer has a complete close loop control over the cleaning cycle that does not need any human intervention for ensuring optimized, satisfactory and trouble free operation.

The Sequential Timer offers following features:

The cleaning is initiated upon reaching 'HIGH' DP and stopped upon achieving 'LOW' DP. With this arrangement you stand to get following advantages:

Saving in compressed air: As the cleaning is done based on the differential pressure feed back, the compressed air is used only when it is required. With this the compressed air wastage is eliminated.

Extension of the bag life: As the cleaning cycles get restricted to a minimum required, the flexing cycles of the bags are reduced. This directly enhances the bag life.

Saving in the power consumption of the fan motor: With the control on the DP, the system curve can be maintained in the region, where the fan efficiency is at it's highest. With this the saving in the power consumed in the fan motor can be achieved.

The timer with ON DEMAND PULSING Facility: This Timer starts at high set point of DP switch (N/O contact) and stops at low set point of DP switch (N/C contact). Timer sequence continues from point where it had stopped, when contact RE-CLOSES.

The timer with Solenoid fault (failsafe) Facility: This Timer will give potential free relay contact of solenoid fault. Relay will be energized, when solenoid is ON or OKAY and if solenoid is faulty or no solenoid is connected to output, then this relay will be de-energized.

The timer Healthy Relay Facility: Potential free relay contacts are provided for sequential controller fail signal to PLC.

PDF created with pdfFactory Pro trial version www.pdffactory.com

Section 2

Operation:

The function of this timer is to send the pulses to the solenoid valves and, intern, trigger the diaphragm valves for sequential cleaning of the bag filter.
The POWER ON RED LED (L17) glows when power is connected to the power input and it indicates healthy condition of the power supply.
The duration of the cleaning pulse is known as ON TIME and is set usually to 40mSec. This setting may need to be changed depending on the response time of the solenoid valves. For severe cleaning the ON time may be increased to 100mSec. This type of cleaning is recommended only during shutdowns.

The ON TIME potentiometer range is from 20mSec to 200mSec.
The duration between two pulses is known as OFF TIME.
The OFF TIME potentiometer range is 2 Sec to 60 Sec.
GREEN LED is indicated by clock (L18).

Each of the output is provided with an LED indicator. The LED indicator remains in ON condition for the duration of the corresponding pulse. (L1 to L15 & L19, L21, L22,L25 & L27)

The connections to the solenoid valve are taken through the PRI 130L terminal strip where SOL COMM is one terminal in each block. Wherein the pulse peak current flowing out through this terminal is monitored via current transformer (CT1) for "NO" solenoid operation /connection. This Timer will give potential free relay contact of solenoid fault. Relay will be energized, when solenoid is ON or OKAY and if solenoid is faulty or no solenoid is connected to output, then this relay will be de-energized indicted by RED LED (L28).

P1 P2 FUNCTION (DP BY PASS SWITCH

A closed contact connected across the Differential Pressure input RED LED (L6) terminals starts the sequential cleaning and an open contact across these terminals stops the cleaning. The restart of the cleaning takes place once the Differential Pressure input senses a close contact and it then starts cleaning from the subsequent out put from where it has stopped.

PDF created with pdfFactory Pro trial version www.pdffactory.com

Section 3

Optimizing the cleaning cycle:

Setting the limits for cleaning to protect the bags:

The optimization of the cleaning cycle is accomplished with the help of a differential pressure gauge. The gauge sends a feed back to the sequential timer to stop/ restart the cleaning cycle. The potential free contact used by the Sequential Timer closes on reaching HIGH DIFFERENTIAL PRESSURE and opens on reaching LOW DIFFERENTIAL PRESSURE across the bags.

It is important to maintain a layer of dust (DUST CAKE) on the surface of the bags. This protects the fabric of the bags from plugging due to fine dust. It is important to maintain the differential pressure to a low value in order to maintain adequate suction at the pick up point of the ventilation systems.

The above two aspects decide the TOTAL static pressure drop across the ventilation system.

It need to be noted that the static pressure drop across the dampers, ducts and various bends that the gas has to negotiate within the bag filter is almost constant for a given process. In this case the static pressure drop of the total ventilation system can vary only with the pressure drop across the bags.

Hence the pressure drop can be adjusted in order to run the fan in the most efficient region by allowing the desired amount of dust cake on the surface of the filter bags.

From the above statements it can be established that optimization of the cleaning cycle need not result in the minimum differential pressure across the bags but it should ensure that the fan operates in its most efficient region.

Usage of FAN CURVES to decide the desired differential pressure:

With the help of the FAN CURVES the desired point of operation can be decided and the differential pressure gauge set points can be adjusted to provide a narrow band of operation around the desired differential pressure level. Narrower the band of operation lesser is the variation in the fan operation which, intern, would ensure a steady running of the process.

Avoid reentrainment of the dust with staggered cleaning:

The cleaning sequence can be made more effective by minimizing the reentrainment of the dust. It needs to be noted that the permeability of a cleaner bag is higher than the bag under cleaning. Thence the gas shall have a tendency to flow through a cleaner bag than a bag with thicker dust cake. If the cleaning is done in a sequential manner then the dust have a tendency to fly off with the gas flow to the adjoining cleaner row of bags. This phenomenon shall increase the indirect dust load on the bag filter and shall need higher frequency of cleaning

With the help of staggered cleaning the reentrainment can be reduced as the cleaner row of the bags and the row of bags that is under cleaning are not closed to each other. The recommended cleaning sequence for a typical 10-row bag filter shall be 1,6,3,8,5,10,2,7,4,9 and repeat. The connections of the sequential timer outputs and the solenoid valves can be wired accordingly, to provide staggered cleaning.

PDF created with pdfFactory Pro trial version www.pdffactory.com

Section 4

Installation and wiring:

Installation:

The timer is shipped with an enclosure to suit the site conditions (weather proof, IP65 or IP55). The timer is to be mounted by the customer at a location, which is easily accessible, free from vibration, protected from direct Sunlight and with an ambient of less than 50^{O}C.

Channel out put selection via flying leads on PCB

The select channels (programming). This is done by setting the flying lead of the programming system to the required No. of channel required at the output i.e. for 12 way output reset lead (Yellow / Red / Blue) to 12th Pin and for 16 Way to16th Pin and so on. If flying lead will open timer will give all outputs.

Wiring:

The following description should be read with reference to the connection diagram Dwg. No. X'1241-02 Rev. 3 Dt. 03-07-2005 attached with this manual.

Step by step wiring Descriptions:

1>Follow the respective electrical wiring diagram attached with this manual (X'1241-02 Rev. 3 Dt. 03-07-2005)
2>There are three types of main connections for controller

TERMINALS CST 2.5

A> power in or Mains Input [see Outgoing terminals (CST 2.5sq.mm) red, black & yellow] terminal No. 1,2,3
B> process control sensor inputs & feed back alarm o/p Terminal No. 4 to 19
C> Controller output (power connections) for process requirement (24VDC solenoid power in this case) Terminal No. 20 to 51 for 16Nos. output . 52 to 62 terminals are spare.

Section 5

Connection Description 0n PCB:

TB1: 2 way (PRI 130L) – P1 P2 TERMINALS

TB-2: 4 way (Phoenix-Green)- 10V AC & 22V AC supply to PCB through toroidal transformer.

TB-3: Current transformer primary input

TB-4: 3 way (Phoenix-Green) Feed back relay output
N/O
POLE
N/C

PDF created with pdfFactory Pro trial version www.pdffactory.com

Section 5

TB-5 to TB-9 (6 way) PRI 130L– POWER OUTPUT (for 16 way) (Typical)

(TB5) 6 WAY TERMINAL STRIP: (CONNECTION FROM LEFT TO RIGHT)

1 : Common Connection for Solenoid

2 : Output through power semiconductor for Valve No. 1

3 : Output through power semiconductor for Valve No. 2

4 : Output through power semiconductor for Valve No. 3

5 : Output through power semiconductor for Valve No. 4

6 : Output through power semiconductor for Valve No. 5

(TB6) 6 WAY TERMINAL STRIP: (CONNECTION FROM LEFT TO RIGHT)

1 : Common Connection for Solenoid

2 : Output through power semiconductor for Valve No. 6

3 : Output through power semiconductor for Valve No. 7

4 : Output through power semiconductor for Valve No. 8

5 : Output through power semiconductor for Valve No. 9

6 : Common Connection for Solenoid

(TB7) 6 WAY TERMINAL STRIP: (CONNECTION FROM LEFT TO RIGHT)

1 : Common Connection for Solenoid

2 : Output through power semiconductor for Valve No. 10

3 : Output through power semiconductor for Valve No. 11

4 : Output through power semiconductor for Valve No. 12

5 : Output through power semiconductor for Valve No. 13

6 : Common Connection for Solenoid

PDF created with pdfFactory Pro trial version www.pdffactory.com

(TB8) 4 WAY TERMINAL STRIP: (CONNECTION FROM DOWN TO UPWARD)

1 : Common Connection for Solenoid

2 : Output through power semiconductor for Valve No. 14

3 : Output through power semiconductor for Valve No. 15

4 : Output through power semiconductor for Valve No. 16

(TB9) 6 WAY TERMINAL STRIP: (CONNECTION FROM DOWN TO UPWARD)

1 : Common Connection for Solenoid

2 : Output through power semiconductor for Valve No. 17

3 : Output through power semiconductor for Valve No. 18

4 : Output through power semiconductor for Valve No. 19

5 : Output through power semiconductor for Valve No. 20

6 : Common Connection for Solenoid

TB-10: 2 way (Phoenix-Green) Secondary of C.T.

TB-11: 3 way (Phoenix-Green) Seq. Cont. Fail Potential free contact.
N/C
POLE
N/O

TB-12: 3 way (Phoenix-Green) Solenoid Fault potential free contact.
N/C
POLE
N/O

Section 6
LED INDICATION ON PCB EXPLANATIONS

L1 to L15,L19, L21,L22,L25 & L27 are output i.e. SOLENOID ON INDICATION

L16 - MANUAL PULSING

L17 - MAINS ON

L18 - OUTPUT CLOCK (PULSE) (Green LED)

L20 - FEED BACK RELAY ON

L24 - P1 P2

L28 - SOLENOID FAULT

L29 – TIMER HEALTHY

PDF created with pdfFactory Pro trial version www.pdffactory.com

Section 7

Description:

The line and neutral terminals on the timer board are to be wired to 220 V AC, 50 Hz power source unless otherwise specified.

Outputs 1 to 16 of the sequential timer are to be connected to one of the connections of the corresponding solenoid valve and the other connection of all the solenoid valves are to be terminated to the SOL. COM. Terminal on each block.

In case of a bag filter with solenoid valves more than 20 or with multiple pressure headers, more than one solenoid valve can be connected to the timer out puts.

Example: (TYPICAL)

Bag filter with 29 solenoid valves: The 1^{st}, 11^{th} and 21^{st} solenoid valves can be grouped to gather to be connected to output no one, 2^{nd}, 12^{th} and 22^{nd} solenoid valves can be grouped together and connected to another out put and so on. The last out put can be connected to 10^{th} and 20^{th} solenoid valves.

In case the bag filter has 18 solenoid valves then the same can be divided in six groups of 3 and the programming jumper can be put in position 7 as marked on the timer board dip switch.

PDF created with pdfFactory Pro trial version www.pdffactory.com

Section 8

BRIEF TECHNICAL SPECIFICATION FOR 20 WAY MICRO CONTROLLER BASED SEQUENTIAL TIMER CARD

1. ITEM	**20 WAY Micro Controller Base Sequential Timer Card**
2. MODEL	**MpS1WD-20#2**
3. APPLICATION	**TO PROVIDE TIMED SEQ. ENERGISATION OF PILOT SOLENOID VALVE**
4. DETAIL OF CONTROLLER (PCB)	
4.1 INPUT SUPPLY	**110V AC or 220V AC *, 50 or 60 Hz.**
4.2 INPUT FUSE (ENCLOSED TYPE)	**1 Amp. 110, 220V AC, (GLASS 20mm)**
4.3 ON TIME	**20 TO 200 MILLISECONDS**
4.4 OFF TIME	**2 TO 60 SECONDS.**
4.5 NUMBER OF SEQ. STEPS	**1 TO 20 ADJ. through Flying Lead**
4.6 TEMP. RANGE OPERATION	**0 TO 50o C**
4.7 CURRENT RATING PER SEQ.:	
a) MAXIMUM INRUSH CURRENT	**10 Amps.**
b) MAX. CONTINUOUS CURRENT	**2 Amps. [1", 2 Nos. (Max. of Solenoid Valves per channel **)]**
4.8 MAINS ISOLATION SWITCH	**PROVIDED ON PCB or DPMCB on chassis**
4.9 ON DEMAND CONTROL (PRESSURE SW. CONTACT)	**PR. SW. TERMINALS (P1, P2), SEQUENCE CONTROLLER STOPS WHEN CONTACT AT PR.SW. OPENS. (PR. LED GLOWS, & CLOCK LED STEADY ON) SEQ. CONTINUES FROM POINT WHERE IT HAD STOPPED, WHEN CONTACT RE-CLOSES.**
4.10 LED VISUAL INDICATIONS:	
a) POWER ON INDICATION	**1 No. LED (5mm - RED COLOR)**
b) OUTPUT ON INDICATION	**20 Nos. LED (5mm - RED COLOR)**
C) ON DEMAND MODE (P1 P2)	**1No. LED (5mm - RED COLOR)**
d) MANUAL PULSING	**1No. LED (5mm - RED COLOR)**
e) CLOCK	**1NO. LED (5mm - GREEN COLOR)**
f) TIMER HEALTHY	**1No. LED (5mm - RED COLOR)**
g) SOLENOID FAULT	**1No. LED (5mm - RED COLOR)**
5. MANUAL PULSING	**FACILITY PROVIDED (P.B. SW.)**
6. FEED BACK RELAY	**POTENTIAL FREE CONTACT, 5A @230 V AC**
7. TIMER HEALTHY	**POTENTIAL FREE CONTACT, 5A @230 V AC**
8. SOLENOID FAULT	**POTENTIAL FREE CONTACT, 5A @230 V AC**
9. PCB DETAILS:	**PTH, GREEN MASKED, IDENT, WITH ANTI CORROSIVE SPRAY COATING.**
a) P.C.B. DIMENSIONS	**276 (L) x 216mm (W)**
b) P.C.B. MOUNTING SIZE	**266(L) x 206(W) mm (MTG. HOLES 4 Nos. 4mm)**
10. ENCLOSURE DETAILS (Optional Extra)	**TYPE- IP-55, SIEMENS GREY POWDER COATED (MOC: M.S. CRCA 1.6 Thk.)**
11. TEST CERTIFICATE	**ONE COPY WITH EACH CONTROLLER**
12. MAKE	**X'CALIBUR AUTOMATION /INLAND SYSTEMS, PUNE-30**

Note : * Supplied as 110V AC only or 220V AC only.

**** Only Solenoid Makes of X'CALIBUR, ASCO, GOYEN CONTROLS, MECAIR AND AVCON must be used which are pulse duty Bag Filter application Solenoids.**

PDF created with pdfFactory Pro trial version www.pdffactory.com