Instruction Manual
For
Sequential Timer

MODEL: WD-VIII - ver 1.0

Customer: ____ RIECO INDUSTRIES LTD_____
Project: ___ _KRUPP (SHAH CEMENT)___
Reference: _____

Contents:

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 Low DP Time out Facility: This timer stops pulsing after time out set on trim pot (P2) on going to low DP and ensures the complete cleaning of bags on stoppage (closure)of bag house operation & stores the last out put it had energized in the memory. When the DP reaches high and the purging is reinitiated, it starts from the subsequent out put. Thus the 'OVER BEATING' of the bags from the initial rows is avoided. This saves the bags from initial rows from an early failure.

The auto flushing mechanism contains a solenoid controlled diaphragm valve that operates periodically and flushes the tubing of the differential pressure gauge. This ensures elimination of a false signal from the D.P. gauge.

Note: The Auto flushing mechanism and the Differential Pressure Switch are optional and may not form part of this supply unless ordered. However the potential free input for the differential pressure switch is provided with the timer card and that can be used for its integration with differential pressure digital feed back.

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 GREEN LED (**L3)** glows when power is connected to the power input and it indicates healthy condition of the power supply. In case the supply fuse blows out RED LED will glow indicate blown fuse (F1 2AMP.)
The duration of the cleaning pulse is known as ON TIME and is set usually to 40 mSec. 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 100 mSec. This type of cleaning is recommended only during shutdowns.

The ON TIME potentiometer range is from 20 mSec to 200 mSec.
The duration between the two pulses is known as OFF TIME.
The OFF TIME potentiometer range is from 2 Sec to 60 Sec.
This indicated by clock RED L ED **(L14)**

Each of the output is provided with an LED indicator. The LED indicator remains in ON condition for the duration of the corresponding pulse. **(L7 to L13 & L15,L16)**

The connections to the solenoid valve are taken through the Phoenix Terminal strip where SOL COMM. is one terminal wherein the pulse peak current flowing out through this terminal is monitored via current transformer **(CT1)** for "NO" solenoid operation /connection. A fault relay **(RLY1)** will operate in case of malfunction indicted by RED LED **(L1)** on .This relay is latching type has to be RESET to declare (accept)the fault , so that circuit is ready to indicate next possible fault if any.

The air header provided with LOW pressure switch ,as sensor input, is used for "CONTINUOUS "Solenoid on fault monitoring via annunciation system. RED LED **(L4)** indicates low header pressure. Annunciation Relay on indicated by RED LED **(L1)**

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.

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.

Section 4

Installation and wiring:

Installation:

The timer is shipped with an enclosure to suit the site conditions(weather proof, IP54 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°C.

Channel out put selection via 10 way DIPswitch (Main PCB) and 8 way DIPswitch (Cascade PCB) :
The select channels (programming) dip switch is used to avoid the delay between energisation of last solenoid valve and the first solenoid valve if lesser outputs are used. The programming dipswitch can be placed to appropriate location as marked on the board.

Example:

For setting Say 12 output put the switch for channel selection for main PCB is to be set on all ten switches OFF so that it will give output of nine & put channel selection switch of cascade PCB on "4" so that only three channels are selected. So point to be noted is that **always put the select channels dipswitch on position one ahead of required one**.

IMPORTANT NOTE: with Dipswitch setting Never Put Two switches "**ON** "at a time. In this case the first switch put ON will not give corresponding Solenoid output.

Wiring:

The following description should be read with reference to the connection diagram provided

Step by step wiring Descriptions

1> Follow the electrical wiring diagram provided (X'1003/1, Rev.2 03.12.2000) TWO PAGES.

2>There are three types of main connections for controller

A> power in or **Mains Input**

B> process control **sensor inputs** **&** **feed back alarm o/p**

C> **Controller output** (power connections) for process requirement (110 V AC solenoid power in this case)

Section 5

Connection Description:

TS6 –Mains input 3way terminal strip

COLD : 110V AC LIVE : 110V AC Earth

TS5- Alarm /Fault relay OUTPUT Potential free 10A, 110 Volts

N/O POLE N/C

TS2 –Header Pressure N/C pressure switch on delay provided for 5 secs

N/C POLE

TS1- On panel N/O switch to reset the fault Relay if operated Indicating faulty sol. Operation

N/O N/O

TS8 –Bag house LOW DIFFERENTIALPRESSURE connection to trigger time out pulsing before stopping Dust collection system.

N/C N/C

TS7- not used in this System

TS9 to TS15 – POWER OUTPUT

SOL1 SOLENOID NO. 1 CONNECTION COM

SOL2 SOLENOID NO. 2 CONNECTION COM

SOL3 SOLENOID NO. 3 CONNECTION COM

SOL4 SOLENOID NO. 5 CONNECTION COM

Section 6

SOL5 SOLENOID NO. 6 CONNECTION
COM

SOL6 SOLENOID NO. 6 CONNECTION
COM

SOL7 SOLENOID NO. 7 CONNECTION
COM

SOL8 SOLENOID NO. 8 CONNECTION
COM

SOL9 SOLENOID NO. 9 CONNECTION
COM

TS16- COMMON CONNECTION FOR CASCADE PCB

NEXT COMMON
NEXT +110VAC

ELECTRIC ALCONNECTIONS TO CASCADE

TS1- +110 VOLT input 2 way terminal strip

PREVIOUS +110V AC
PREVIOUS COMMON

TS2- not used in this System

TS3 to TS9 – POWER OUTPUT

SOL1 SOLENOID NO. 1 CONNECTION
COM

SOL2 SOLENOID NO. 2 CONNECTION
COM

SOL3 SOLENOID NO. 3 CONNECTION
COM

SOL4 SOLENOID NO. 3 CONNECTION
COM

SOL5 SOLENOID NO. 5 CONNECTION
COM

SOL6 SOLENOID NO. 6 CONNECTION
COM

SOL7 SOLENOID NO. 7 CONNECTION
COM

Section 7

SOL8 SOLENOID NO. 8 CONNECTION COM

TS10- Power to next cascade

NEXT COMMON NEXT 110V

LED INDICATION ON MAIN (MASTER) PCB EXPLANATIONS

L1 ALARM RELAY ON
L2 MAINS FUSE BLOWN
L3 MAINS FUSE OK
L4 HEADER PRESSURE LOW
L5 24 SOLENOID POWER OK
L6 DP ACROSS PLENUM & HOUSING LOW IN DUST COLLECTOR SYS.
L7-L13,L15,L16 1 TO 9 SOLENOID ON INDICATION
L14 SOLENOID ON AND OFF CLOCK

Section 8

Description:

The line and neutral terminals on the timer board are to be wired to 110 V 50 Hz power source unless otherwise specified.

Outputs 1 to 17 of the sequential timer (Main PCB + Cascade PCB) 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.

In case of a bag filter with solenoid valves more than 17 or with multiple pressure headers, more than one solenoid valve can be connected to the timer out puts.

Example:

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

Section 9

Technical specifications:

1. **Input Power:** **110 V ac +20% - 10%, 50Hz or 60 Hz 2 Amp (Max)**

2. **Output Power:** **24 Triac outputs, 2 Amp (Max) +110V AC.**

3. **Control Signal:** **Potential free signal from differential pressure LOW DP switch.**
   (To be ordered separately) **Close to Start**
   Open to Stop

4. **Time out period (pot P2):** **25 secs to 30 min**
   For DP switch control
   (after stopping dust collector FAN system)

5. **Air Header Low Pressure :** **Potential free signal from differential pressure LOW Switch**
   (To be ordered separately) **Close to normal**
   Open to fault

6. **Time out period for header: pressure switch** **5 secs fixed built in the unit**

7. **Fault / Alarm Relay output :** **Potential free 10A, 110 VAC Resistive**
   For Solenoid Malfunction

8. **Toroidal Transformer for powering : circuitry & solenoid DC energy** **Primary 0-110, 0-110VAC, 50 Hz**
   Secondary 6-0-6-12V, 200mA

9. **Each single pulse is monitored : for Solenoid healthy o/p for no connection , for short circuit, for blown fuse F2** **Alarm relay output for fault O/P. is provided**

10. **Zero crossing detection for : Triac trigger** **Provided as Standard Feature**

11. **Timing for Pulse on & off period :** **ON- 20 mSec to 200 mSec**
    OFF- 2 Sec to 60 Sec

12. **Diagnostic & useful function specific:** **Incorporated LED's on PCB**

13. **Connection wire between MAIN : PCB & CASCADE PCB** **9 Pin "D"type connector using multicore flexible** Wire

Section 10

Technical specifications:

14.MAIN PCB to chassis spacers :	**4 nos.---------- M4 x 25**
15.Support Spacers :	**4 nos. ----------M4 x 25**
16.MAIN PCB Size :	**276mm x 200mm**
17.MAIN PCB Mounting :	**265 mm x 190 mm**
18.Cascade PCB to Chassis Spacers :	**4 nos.---------- M4 x 25**
19.Support Spacers in Cascade PCB:	**2 nos. ----------M4 x 25**
20.CASCADE PCB Size :	**200mm x 177mm**
21.CASCADE PCB Mounting :	**190 mm x 166 mm**
22.Enclosure:	**IP-55 enclosure, suitable for Out door duty, With epoxy polyester coating (Admiral gray)**
23.Differential pressure switch: (CLIENT'SDCOPE/OPTION)	**0 to 250 mm WC with ± 2% accuracy over the entire range. with settings for HIGH and LOW DP.**

Points to be noted for timer DO & DON'T DO things

1> Dip switch setting Never Put Two switches on at a time the first switch put on will not give corresponding o/p.
2> For setting Say 12 output put the switch for channel selection for main PCB is to be set on all ten switches OFF so that it will give o/p of nine & put channel selection switch of cascade PCB on 4 so that only three channels are selected. So point to be noted is that always put the Dipswitch on position one ahead of required one.
3> Before energizing the timer check fuses are in secured position & tight.
4> Connect live to live & cold to cold connection.

Watch for Diagnostic LEDS

1> Fuse F1 is OK green L3 will light on power on. Other wise Red LED will glow indicating that fuse is blown or not fitted properly.
2> Led L5 will indicate healthiness of 24-volt power used as pulsed dc for solenoid energisation
3> If fuse F2 is loose or blown off output LEDS from L7 to L16 will pulse very weakly (this is because of 5 volt power added to 24 volt pulsed dc for Triac triggering (BT 136-6)
4>Cascading of slave PCB has also function Indicators Like +12v POWER LED1, Clock RED LED L9,Healthy +24 volt Power L1 and L3 to L11 for solenoid out put SOL2 to SOL8

Down Load Manual

Email to :