Donaldson
Torit®

STi Plus Pulse Timer Range

(Sold after September 2019)

Installation and Operation Manual

Installation, Operation, and Service Information

English
Master Language

STi Plus Timer Range (09/19)
Card Version 4.4 | Revision 0

PLEASE READ THIS DOCUMENT CAREFULLY PRIOR TO INSTALLATION AND/OR START UP. IT CONTAINS SPECIFIC PRECAUTIONARY STATEMENTS RELATIVE TO WORKER AND EQUIPMENT SAFETY.

THIS DOCUMENT SHOULD BE READ IN CONJUNCTION WITH THE INSTALLATION, OPERATION AND MAINTENANCE MANUAL OF THE DUST COLLECTOR UNIT WHOSE REVERSE JET PULSE CLEANING SYSTEM IT IS TO CONTROL.

⚠ WARNING

WARNING, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in personal injury and extensive damage. Obey all safety messages that follow this symbol to avoid injury, death or damage.

NOTICE

NOTICE is used to address practices not related to personal injury that may result in damage to equipment.

⚠ WARNING

Regularly check that all equipment is properly selected, sized and operated for the intended use. Discuss any questions relating to the application, use or maintenance of any Donaldson equipment with your Account Manager.

The delineation of hazardous areas within a work area or facility is beyond the responsibility of Donaldson. Consequently, the suitability of electrical equipment provided by Donaldson to be installed within these hazardous areas is also not the responsibility of Donaldson.

Electrical equipment supplied by Donaldson may or may not be suitable for use in a hazardous area. Certain equipment is suitable for use in certain types of hazardous areas and those equipment are provided with certificates of suitability.

In order to protect your interest, Donaldson strongly recommends that you seek professional advice from qualified persons regarding the delineation of hazardous areas and the suitability of Donaldson's equipment within these areas.

The STi Plus timer in its standard form as described in this manual is NOT suitable for hazardous areas. Please consult your Account Manager for special requirements.

The timer must be installed in compliance with Australian and New Zealand standards. Improper installation may contribute to conditions in the work area or facility that could result in severe personal injury as well as product and/or property damage.

Contents

1. PRODUCT DESCRIPTION

The Solid-state pulse Timer intelligent Plus (STi Plus) is the newest addition to the Donaldson range of pulse timers. Building on the previously introduced embedded STi platform, the STi Plus range provides cutting edge options for controlling the reverse pulse cleaning jets in continuous duty dust collectors. The system has been tested and comes rated for use in environments up to 45°C. When deployed in environments under 0°C, heaters may be required.

After the success of the STi platform, these units have been rationalised to two configurations:

- STi Plus unit which is a standard pulse timer with automatic fault detection and troubleshooting features.
- STi Plus unit with On Demand Cleaning and Tube Cleaner (STi Plus ODCTC unit) combines the STi Plus timer with differential pressure based control and incorporates a tube cleaner which ensures accurate differential pressure measurement.

	STi Plus Basic Timer	STi Plus ODC TC timer
	A basic timer which incorporates time interval based pulsing.	An advanced timer which incorporates time interval based pulsing as well as differential pressure control. The timer includes a tube cleaner.
ENCLOSURE PROPERTIES		
Polycarbonate UV stabilised enclosure	Standard	Standard
Enclosure IP66 rated with screw-on lid	Standard	Standard
BASIC FEATURES		
Alphanumeric digital display	Standard	Standard
Manual (time interval based) cleaning	Standard	Standard
Down-time cleaning	Standard	Standard
Differential pressure-controlled cleaning	N/A	Standard
Ability to read current timer status remotely using Modbus RTU	Read Only	Read/Write (some registers are Read Only)
Counters for recording operational hours and number of pulses generated	Standard	Standard
Ability to pulse individual valves to aid site troubleshooting (electrical faults only) through maintenance mode	Standard	Standard
Maximum number of valves that can be connected to the master card	10 valves	10 valves
Maximum number of valves that can be independently controlled in sequential mode	60 valves[1]	60 valves[1]
Maximum number of valves that can be independently controlled in parallel mode	Maximum 4 blocks, each with up to 60 valves[1]	Maximum 4 blocks, each with up to 60 valves[1]

[1]Contact Donaldson Technical Services if you need a timer for larger systems.

	STi Plus Basic Timer	STi Plus ODC TC timer
	A basic timer which incorporates time interval based pulsing.	An advanced timer which incorporates time interval based pulsing as well as differential pressure control. The timer includes a tube cleaner.
BASIC FEATURES		
Pulsing sequence available	Standard, Arbitrary	Standard, Arbitrary
Range of pulse duration	50-990 ms	50-990 ms
Range of interval between pulses during NORMAL mode	1-999 s	1-999 s
Automatic solenoid valve electrical fault detection	Standard	Standard
Number of cleaning cycles that can be activated during downtime cleaning	0-99 cycles	0-99 cycles
Range of interval between pulses during FAST mode	N/A	1-999 s
Range of interval between forced pulses	N/A	1-24 hrs
Range for tube cleaner activation duration	N/A	0-10 sec
Range for interval between tube cleaner activations	N/A	1-24 hrs
Units for pressure measurement	N/A	kPa, in H2O and mm H2O
Code protection for settings update	Standard	Standard
INPUTS AVAILABLE		
Power supply requirements	24VDC or 110-240VAC with spike protection	24VDC or 110-240VAC with spike protection
Ability to remote interrupt	2 dry contacts	2 dry contacts and through Modbus
Ability to monitor external sensors (except PlusdP and DiaphragmPlus sensors). Note: interrupt and sensors inputs are on the same terminals.	N/A	Max. 2 sensors
OUTPUTS AVAILABLE		
Communication to extension cards via RS485 bus through CAT5 cable with twisted pairs	Standard	Standard
Constant 24VDC output available (max. draw 0.3 amp) via RS485 bus	Standard	Standard
Relay alarm for system health, triggered when the timer identifies that the dust collection plant is no longer able to operate efficiently	Standard (timer does not measure dP so system health relay is not linked to current dP)	Standard

	STi Plus Basic Timer	STi Plus ODC TC timer
	A basic timer which incorporates time interval based pulsing.	An advanced timer which incorporates time interval based pulsing as well as differential pressure control. The timer includes a tube cleaner.
OUTPUTS AVAILABLE		
Relay alarm for general warnings, triggered when the timer identifies when that there might be something wrong with the dust collection plant	Standard	Standard
4-20mA current loop for monitoring instantaneous differential pressure	N/A	Standard
OPTIONAL FEATURES, REQUIRING ADDITIONAL HARDWARE		
Automatic diaphragm valve mechanical fault detection through compressed air header pressure measurement (DiaphragmPlus)	Y	Y
Remote differential pressure measurement (PlusdP)	N/A	Y
Ability to monitor if any of the filters have ruptured/ broken bag detection	Y	Y
Ability to identify which filter has been ruptured (LeakPlus)	Y	Y
Ability to connect timer to the internet through an ethernet connection (LANPlus)	N/A	Y
Ability to connect timer to the internet through a wireless connection (WiFiPlus)	N/A	Y

NOTICE

If the STI Plus ODCTC unit is placed more than 3m away from the dust collector, it needs to be upgraded to include the tube isolate function. Contact Donaldson Technical Services to discuss specific requirements.

1.1 OPERATIONAL MODES

Users are able to program the STi Plus unit to operate the reverse jet pulse cleaning mechanism whilst the dust collection is activated. It is also possible to operate the cleaning mechanism after the collector is shut down (offline or down-time cleaning). The STi Plus ODCTC unit is also able to activate cleaning mechanism based on differential pressure to maintain a relatively constant pressure drop across the filters.

1.1.1 TIME INTERVAL BASED PULSING

The STi Plus unit can activate the reverse jet pulse cleaning mechanism on the dust collection plant at regular time intervals. This ensures that over a complete cleaning cycle each valve in the pulse cleaning system is pulsed consecutively ensuring that all the filters in the dust collection plant are regularly cleaned.

1.1.2 OFFLINE OR DOWN-TIME CLEANING

The STi Plus unit is able to monitor the operation of dust collection plant watching for the fan to start and turn off. After a time delay to allow the fan to come to a complete stop, the STi Plus unit activates the pulse cleaning mechanism on the dust collection plant for a preselected number of cleaning cycles.

⚠ WARNING

Donaldson do not recommend that the offline cleaning system be used in dust collector units fitted with a soft explosion relief membrane. Activation of the cleaning mechanism in the absence of the static head generated by the fan can seriously damage these explosion membranes.

1.1.3 DIFFERENTIAL PRESSURE CONTROL

The STi Plus ODCTC unit is able to measure the differential pressure between the clean- and the dirty- air plenum's. It controls the differential pressure by turning the cleaning mechanism of the dust collection plant on and off at user selected limits. There are four user selected limits: the High pressure set point where the cleaning mechanism is activated using the standard interval; the low pressure set point where the cleaning mechanism is deactivated; the High-high pressure set point where the cleaning mechanism is activated using the fast mode; and the Alarm set point where the System Health Alarm relay output state changes to activate an external alarm supplied by others. The Ultra-low pressure set point is factory set at 5 mmWG and cannot be changed by the user.

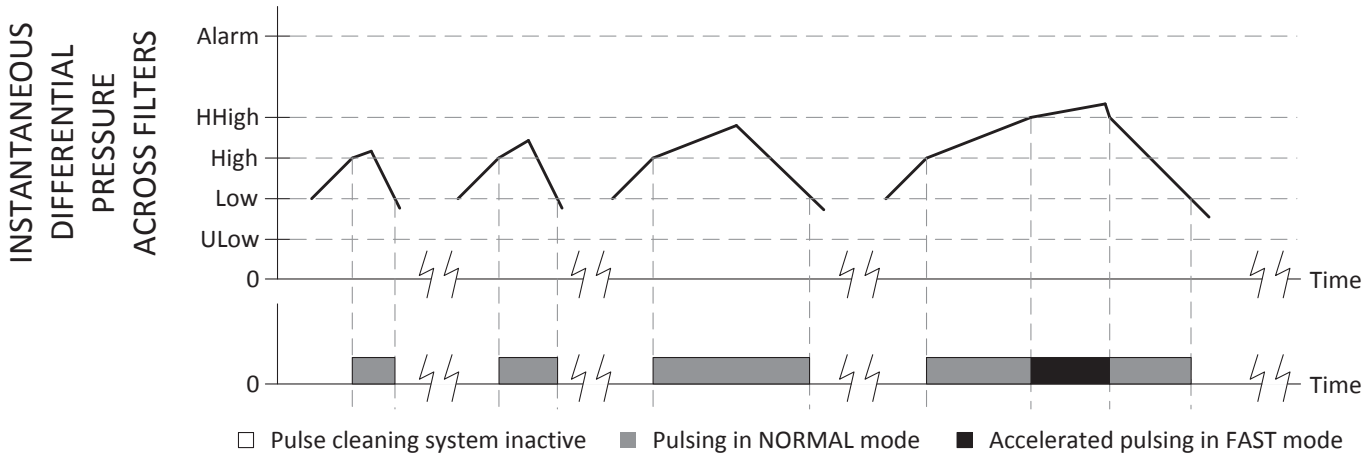


Figure 1: Illustration of pulse cleaning system operation under differential pressure control in a STi Plus ODCTC unit

2. STANDARD FEATURES

As with the STi timers, the basic building blocks of the STi Plus platform are the master card and the extension card which talk to one another using the RS485 communication protocol. The master card can control the pulsing of up to 10 valves, and the addition of each extension card increases the number of valves that can be controlled by 10.

These cards are mounted in UV stabilised polycarbonate enclosures with screw-on type clear lids. When mounted in these enclosures, the timers are not suitable for deployment in hazardous rated areas. Contact Donaldson Technical Services when considering timers for hazardous areas.

In line with Donaldson's process risk minimisation philosophy, standard STi Plus Timer is designed for 24VDC controls. Equipment with different control ratings are custom designed to suit requirements.

The STi Plus unit is designed to be tweaked to suit any dust collection plant as the pulse duration and interval are completely adjustable and the valve pulsing order can be easily configured on site. In addition to this, it brings several industry leading features to aid maintenance planning and site troubleshooting including:

- Current monitoring for electrical faults
- Fast pulsing when differential pressure is above the high-high set point
- Easy interfacing with external sensors and systems including PLC and SCADA
- Monitoring system up-time, availability and mean time between failure (MTBF) for maintenance planning

The STi Plus unit is able to interface with most plant control systems.

Using the industry standard in serial communication Modbus RTU, the STi Plus ODCTC unit is able to communicate with almost any PC, PLC, DCS or SCADA system. This allows users/administrators to continuously monitor information from the timer. Settings can be altered through Modbus on the STi Plus ODCTC unit. Up to 254 STi Plus units can be daisy chained.

Contact Donaldson Technical Services for more details regarding Modbus facility on the STi Plus units.

The LED display on the unit is factory set to turn off after 10minutes of inactivity. It is possible to modify this setting to keep the display on permanently on the ODCTC unit. Refer STi Plus ODCTC Screen Map in Section 9.

Where standard equipment does not meet site requirements, please contact a Donaldson Sales Representative to discuss specific requirements.

3. OPTIONAL EQUIPMENT

3.1 PlusdP REMOTE DIFFERENTIAL PRESSURE MANAGEMENT

If the STi Plus ODCTC unit is mounted significantly far away from the dust collection plant, it might not be able to detect differential pressure changes accurately due to the length of the tubing between the pressure taps on the collector and the pulse timer.

It is possible to mount a differential pressure transducer (separately supplied) immediately next to the dust collector. The pressure transducer can electrically communicate differential pressure to the STi Plus ODCTC unit for activating and deactivating the cleaning cycle.

3.2 LeakPlus BROKEN BAG DETECTION

At certain sites, there can be restrictions placed by government regulatory environmental protection agencies regarding plant emissions. Whilst there are other particulate sensors available in the market which can detected if there are emissions from the dust collection plant, other systems may not identify which filter is giving rise to the emission. The STi Plus unit is able to assist with site troubleshooting by isolating the valve that was pulsed when emissions took place.

3.3 DiaphragmPlus DIAPHRAGM VALVE MECHANICAL FAULT DETECTION

The pulse cleaning system on any dust collection plant consists of a pilot valve (actuated by a solenoid) which controls opening and closing of the main pulse diaphragm valve. Over time, the diaphragm material will deteriorate under repeated fatigue loading and therefore the diaphragm valve may not open or close completely impacting the efficacy of the cleaning system.

When coupled with a separately supplied pressure sensor, the STi Plus unit monitors the manifold pressure in the cleaning system to identify faulty diaphragm valves.

3.4 LanPlus REMOTE MONITORING OVER THE INTERNET

To accommodate larger systems extending over multiple geographic sites, the serial communication ability of the STi Plus unit can be extended to include network communication by adding separately supplied gateways to the unit. The gateway allows remote access to the STi Plus unit through the internet.

3.5 WiFiPlus WIRELESS REMOTE MONITORING OVER THE INTERNET

Where it becomes impractical to lay cabling to connect the STi Plus unit to the network, the unit can connect to an existing wireless network using a separately supplied wireless gateway.

The LANPlus add-on features are all available with the WiFiPlus add-on.

It is possible to have some units wired to the network whilst others are connected wirelessly to the network.

4. INSPECTION ON ARRIVAL

1. Inspect timer unit on delivery.
2. Report any damage to the delivery carrier through comments on the proof of delivery.
3. Compare unit received with the description of product ordered.
4. Report any faulty or incomplete shipments to the delivery carrier and your Donaldson Account Manager. Donaldson reserves the right to refuse any warranty claim if this is not notified to the company within 48 hours of goods receipt.

5. MECHANICAL INSTALLATION

1. Choose a vibration free location on or near the dust collector
2. Mount the timer in the selected location

NOTICE

Depending on the dust collector unit that the timer has been configured for, it may have pilot solenoid valves fitted on the timer enclosure. If the timer enclosure has pilot solenoids fitted, it must not be mounted more than 1.5m away from the diaphragm valves on the collector.

6. ELECTRICAL WIRING

1. All electrical wiring and connections, including electrical grounding should be installed in accordance with the latest version of the Australian/ New Zealand Wiring Rules AS/NZS 3000.
2. All cables shall be sized in accordance with Australian Standard AS3008.1.1.
3. Check with local ordinances for additional requirements that apply. The appropriate wiring schematic and electrical rating must be used.

NOTICE

When wiring the timer, take care when fitting the face plate over the buttons on the master PCB. Physical damage to the cards is not covered under Donaldson warranty.

6.1 TERMINAL MAPS ON DIFFERENT CARDS

6.1.1 The Master Card

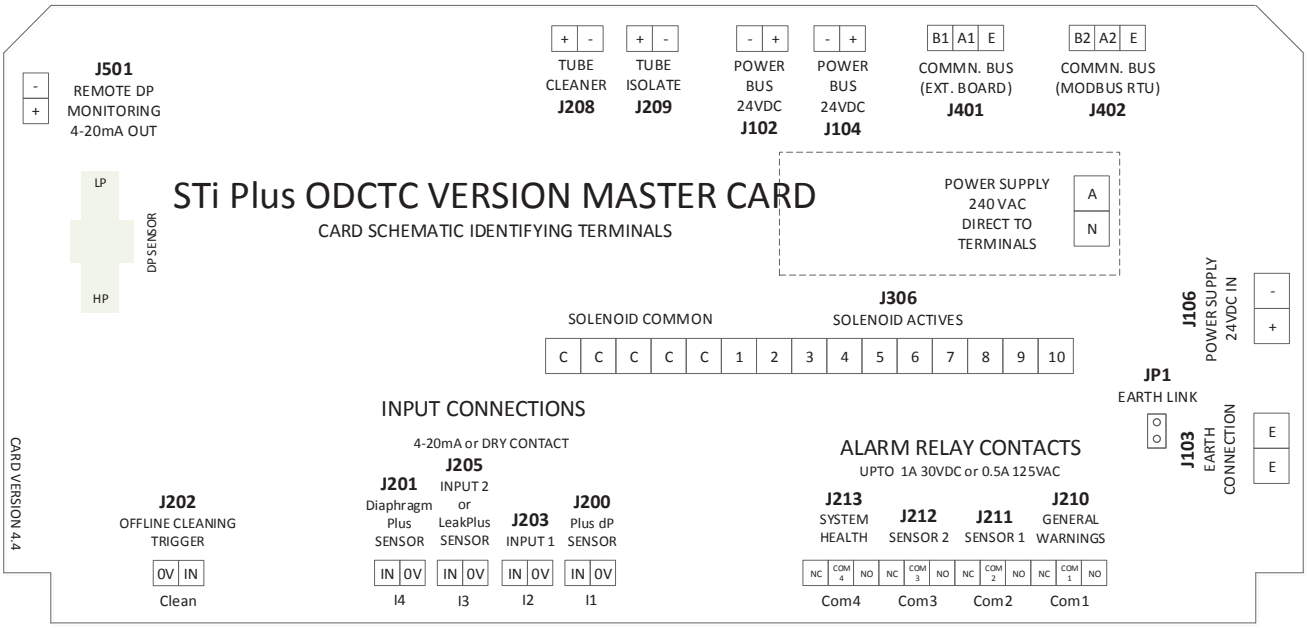


Figure 2.1: Schematic diagram identifying the different terminals on a STi Plus ODCTC unit (DC version shown). Contact Donaldson Technical Services for details of the legacy AC version.

J102 Power OUT, 24VDC
J103 Earth Connection
J104 Power OUT, 24VDC
J106 Power IN, 24VDC
J200 PlusdP sensor contacts§
J201 DiaphragmPlus sensor contacts§
J202 Off-line Cleaning Trigger contacts
J203 Sensor 1 contacts
J205 LeakPlus or other sensor contacts§
J208* Power to tube cleaner
J210 Relay contacts for General Warnings
J211 Relay contacts for sensor connected to J203
J212 Relay contacts for sensor connected to J205
J213 Relay contacts for System Health alarm
J306 5x solenoid commons + 10x solenoid active contacts
J401 Communication bus to extension card
J402 Modbus RTU Communication bus
J501 dP monitoring contacts, 4-20mA out

§ Additional equipment required for this function

⚠ WARNING

For timers deployed inside a hazardous area, the Earth Link JP1 MUST be installed.

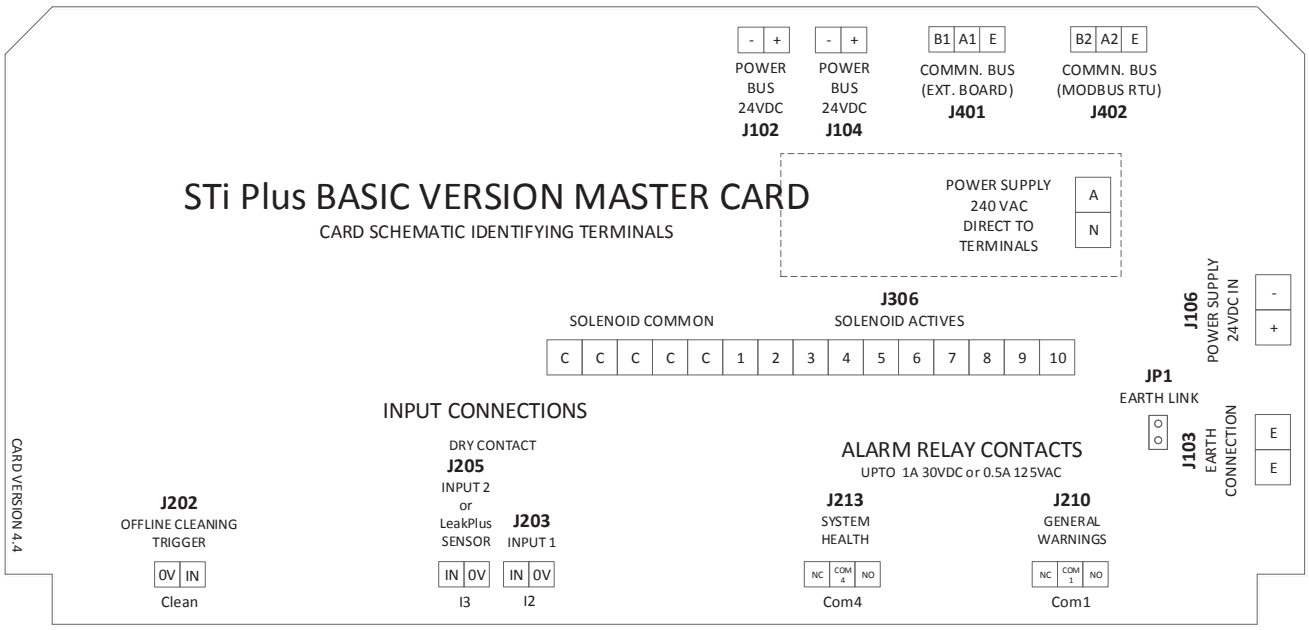


Figure 2.2: Schematic diagram identifying the different terminals on a STi Plus BASIC unit (DC version shown). Contact Donaldson Technical Services for details of the legacy AC version.

J102 Power OUT, 24VDC
J103 Earth Connection
J104 Power OUT, 24VDC
J106 Power IN, 24VDC
J202 Off-line Cleaning Trigger contacts
J203 Sensor 1 contacts
J205 LeakPlus or other sensor contacts[§]
J210 Relay contacts for General Warnings
J213 Relay contacts for System Health alarm
J306 5x solenoid commons + 10x solenoid active contacts
J401 Communication bus to extension card
J402 Modbus RTU Communication bus

[§] Additional equipment required for this function

⚠ WARNING

For timers deployed inside a hazardous area, the Earth Link JP1 MUST be installed.

6.1.2 The Extension Card

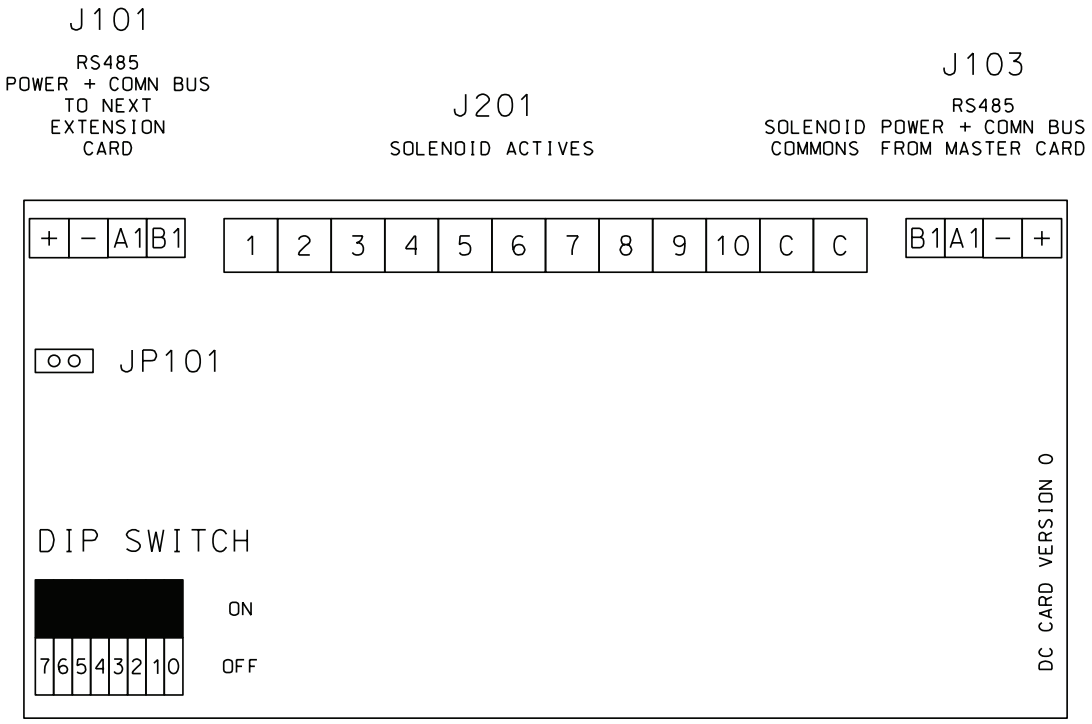


Figure 3: Schematic diagram identifying the different terminals on a STi Plus extension card. A jumper should be installed through JP101 on the last extension card in a daisy chain.

6.2 DIP SWITCH CONFIGURATION ON EXTENSION CARD

6.2.1 Sequential verses parallel pulsing

The STi Plus unit is able to activate the solenoids on the pilot valves one at a time (sequential pulsing) or multiple valves at a time (parallel pulsing) to optimally clean the filters in the dust collection plant.

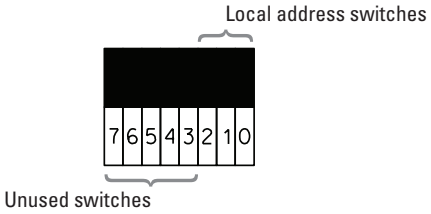
Parallel pulsing can occur when one or more extension cards are connected to the system. Whether valves are pulsing sequentially or in parallel is controlled by the DIP switches on the extension cards.

6.2.2 Setting up DIP switches on the extension cards

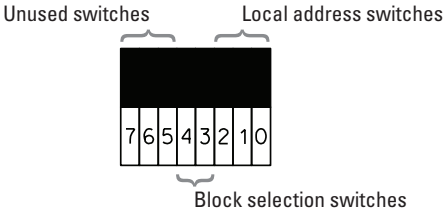
There are a set of 8 DIP switches on the bottom left corner of each extension card. These DIP switches control how the extension card sends and receives information to and from the STi timer master card, allowing the master to maintain effective control over the solenoid valves connected to extension card.

Switches 0 to 2 give each extension card a unique binary local address so that it can be individually identified by the master card. Addresses from 000 to 101 are possible in a standard timer unit.

Switches 5 to 7 are unused in the standard units, and do not impact extension card configuration.



Sequential mode



Parallel mode

Figure 4: Configuration of the DIP switches on the STi Plus timer extension card

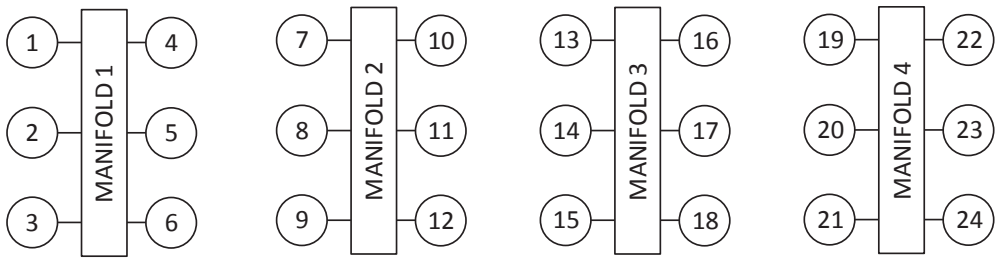
In Sequential Mode

Switches 3 and 4 are normally unused in Sequential Mode. If any of these are set to the ON position, the configuration automatically switches to Parallel Mode.

In Parallel Mode

All cards with the same local address form a group that pulses together.

Switches 3 and 4 select the cards to which the extension belongs to. The schematic below summarises the block and valve identification followed on the STi Plus architecture.



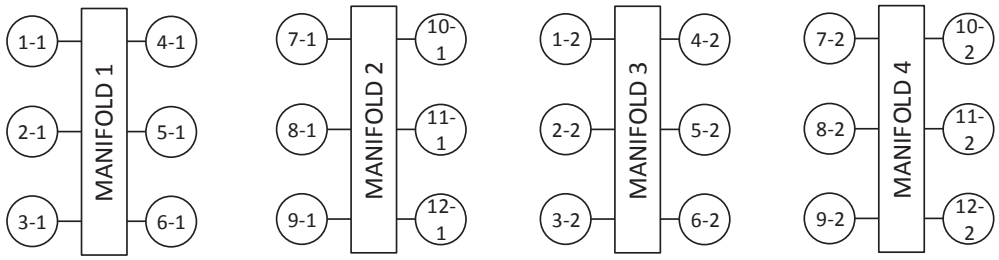
Controlled by Master

Controlled by Extension 1
DIP: 000 00 001

Controlled by Extension 2
DIP: 000 00 010

Controlled by Extension 3
DIP: 000 00 011

Example 1: Single block manifold system – individual valves pulse one after another



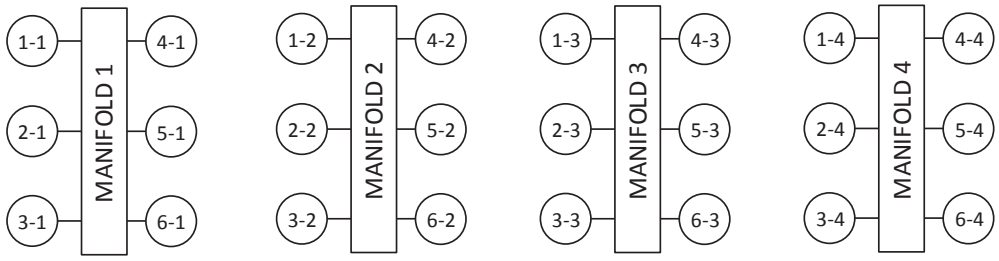
Controlled by Master

Controlled by Extension 1
DIP: 000 00 001

Controlled by Extension 2
DIP: 000 01 000

Controlled by Extension 3
DIP: 000 01 001

Example 2: Double block manifold system – individual valves on manifolds 1,3 and 2,4 pulse together



Controlled by Master

Controlled by Extension 1
DIP: 000 01 000

Controlled by Extension 2
DIP: 000 10 000

Controlled by Extension 3
DIP: 000 11 000

Example 3: Four block manifold system – individual valves on manifolds 1,2, 3 and 4 pulse together

Figure 5: Block and valve identification scheme used across the STi Plus platform.

6.3 Check wiring between master and extension cards

Depending on your dust collection plant, the STi Plus Timer may be supplied with extension cards in addition to the master card fitted in the same enclosure or in separate enclosures. In most cases while the STi Plus unit will come with factory wiring between the master and extension card(s) it is good practice for the site electrician to verify that the termination of the CAT5 cables at either end.

Connection between different extension cards follows the same principle as the connection between the master and an extension card. The wiring between the extension cards is daisy chained.

If the power and communication busses of the RS485 connection between the master and extension cards are not fitted correctly, this will cause irreparable damage to the timer cards and the cleaning mechanism of the dust collection plant will not operate correctly. Most commonly, numerous valves will report electrical faults and the timer will show a Cumulative Valve Failure error. Donaldson recommend that each twisted pair of the CAT5 cable is labelled so that the correct pair can be identified during installation.

6.4 Wiring from the STi Plus unit to the remote pilot enclosure(s)

In standard configuration, the dust collection plant will be supplied fitted with one or more non-hazardous rated aluminium enclosure housing the pilot valves. The STi Plus Timer will be loose supplied for site fitment by others. If you need the timer factory wired to the pilot valves by Donaldson, please contact your Donaldson Account Manager to discuss specific requirements.

1. Drill the STi enclosure with suitable size and number of holes for wiring to the pilot enclosures. The pilot enclosures come with precast holes to suit M20 or M25 cable glands.
2. Fit cable glands in the holes suitable to the application and to suit site requirements.
3. Pass a multicore cable with the required number of cores to suit the dust collection plant.
4. Connect the timer end of the cable to solenoid active and common terminals on the master and extension cards whilst connecting to the enclosure end of the cable to the screw/spade terminals on the solenoids inside the enclosure.

Ensure that the common and active terminals of each solenoid are connected to the same master or extension card.

6.5 (Optional) Wiring for Remote Interrupt Signals

It is possible to temporarily pause (remote interrupt) the pulse cleaning system by passing a digital signal into either input junctions I2 (J203) or I3 (J205). The input junction will also need to be selected as a "Digital Interrupt" in software. Refer to the Screen Map shown in Section 9.

When the connection timer between the terminals of either these junctions is open, pulsing of the valves will be paused.

To deactivate this feature, make sure to bridge the terminals of the corresponding junction to ensure that the connection between them is permanently closed.

6.6 (Optional) Wiring for External Sensors and Coupled Relay Alarms (not available for the basic version)

The STi Plus timer is able to monitor external sensors connected to either input junctions I2 (J203) or I3 (J205). The Timer triggers independent feedback relays if the input signals to the junctions crosses the threshold values set in software. The feedback relay coupled to I2 (J203) is Com2 (J211) and the one coupled to I3 (J205) is Com3 (J212).

It is also possible to halt the pulse cleaning system if the sensors cross the threshold values if they are set as "Critical Alarm" in software. Refer to the Screen Map shown in Section 9.

The relay contacts are rated up to 1A 30VDC or 0.5A 125VAC.

To deactivate this feature, make sure to bridge the terminals of the corresponding junction to ensure that the connection between them is permanently closed. Select the junction as "Not used" in software.

6.7 (Optional) Wiring for Offline cleaning

Depending on the nature of the product being collected by the dust collector, this product might adhere to the filter elements when the fan is running. In this case, it might be beneficial to pulse the filter media 3-5 times after the fan has been switched off, to dislodge or remove any product deposited on the filters.

⚠ WARNING

Donaldson do not recommend that the offline cleaning system be used in dust collector units fitted with a soft explosion relief membrane. Activation of the cleaning mechanism in the absence of the static head generated by the fan can seriously damage these explosion membranes.

To activate this feature, the normally-closed (NC) voltage-free auxiliary contact of the dust collector fan must be wired to the Offline Cleaning terminals on the STi Plus unit master card, so that it can detect when the fan has been turned off.

To deactivate this feature, make sure to bridge the two contacts of Offline Cleaning terminals.

The timer usually ships from the facility with this function disabled, and will need to be programmed to activate the offline cleaning functionality. See Section 9 of the manual for details.

6.8 (Optional) Wiring for General Warning Feedback

The STi Plus unit uses closed loop feedback to issue warnings related to the status of the dust collection plant.

It has on-board current sensing electronics to identify a solenoid has a short or an open circuit. If an open or a short circuit is detected on any of the solenoids, the supply to that solenoid is terminated as a protective mechanism.

The STi Plus unit also monitors if the number of extension cards that it should be connected to it (defined by its settings which are automatically assessed when it is powered on) are actually connected to it. If during operation it detects that the number of actual extension cards does not match the number that it should be controlling (indicating a communication fault), it triggers a warning.

If the pulsing of the valves has been paused either manually at the timer or using the remote interrupt feature, the timer triggers a warning.

The valves in the cleaning mechanism need to be serviced at regular intervals to ensure that they are functioning optimally. The STi Plus unit has counters that keep track of the number of hours that it been used and the number of pulses generated by the valves. The timer triggers a warning when the counters have exceeded their factory set limits.

Warning Type	Relay On	Relay Off
Communication Error	Unable to communicate with all extension cards	Able to communicate with all extension cards
Individual Valve Fault	SC/OC detected on any valve	No valve faults
Pulsing Notification	Pulsing paused manually, by interrupt signal or through Modbus	Valves pulsing
Service needed	Counters crossed threshold	Counters below threshold

Table 1. General Warnings Relay Trigger Map (Relay ON = something may require operator attention)

If any of the above conditions are met, the state of the General Warning Feedback relay will be switched.

To connect an external alarm system to utilise this feature, wire the external alarm to the relay contacts for General Warnings on the master card. These relay contacts are rated to 1A 30VDC or 0.5A 125VAC.

6.9 (Optional) Wiring for System Health Feedback

The STi Plus unit uses closed loop feedback to confirm that it is able to stabilise the differential pressure in the dust collection plant. In particular, if it detects electrical faults in 30% or more of the solenoids in the pilot valves, it identifies that efficiency of the pulse cleaning system is compromised as there has been Cumulative Valve Failure. In the event that the differential pressure crosses the Alarm Pressure set point the unit recognises that it has failed in maintaining differential pressure within the safe operating range.

Finally, if the unit loses power, it knows that the pulse cleaning system has been de-energised and the filters are not being cleaned. If any of the above conditions are met, the state of the System Health Feedback relay will be switched.

Alarm Type	Relay On	Relay Off
Cumulative Valve Failure	Valves functioning ok	More than 30% valves failed
Auto dP management Failure	dP below alarm set point	dP over alarm set point
Power	Power connected	Power disconnected

Table 2. System Health Relay Trigger Map (Relay ON = system functioning properly)

To connect an external alarm system to utilise this feature, wire the external alarm to the relay contacts for System Heath on the master card. These relay contacts are rated to 1A 30VDC or 0.5A 125VAC.

6.10 (Optional) Wiring for Modbus remote monitoring

To allow the STi Plus unit to communicate with a Master PC/PLC, connect the system to the Modbus terminals on the master card using a CAT5 cable. The maximum distance between the timer and the Master PC/PLC should be restricted to 100m.

A PLC will be able to communicate with the timer using SCADA or other equivalent software; if a PC is used, it will need to have Modbus Poll or other equivalent software installed.

The Master PC/PLC should be connected to Modbus RTU (J402) terminals on the timer master card. Additional hardware may be required based on the application. Contact Donaldson Technical Services for more information.

6.11 (Optional) Wiring of DiaphragmPlus Sensor

To allow the STi Plus unit to detect mechanical faults on the diaphragm valves mounted on the dust collector, a suitable pressure sensor should be mounted on the compressed air line feeding the manifold.

This pressure sensor should be wired to the DiaphragmPlus sensor terminals (J201) on the timer master card. The timer master card will need to be programmed to activate DiaphragmPlus functionality; see Section 9 of the manual for details.

6.12 (Optional) Wiring for LeakPlus sensor

(not available in the basic version)

To allow the STi Plus unit to detect if dust particles are leaking through the filters, a suitable dust probe should be mounted on the clean air plenum of the dust collector or discharge duct from the collector.

This dust probe should be connected to the LeakPlus or Other sensor terminals (J205) on the timer master card. The timer master card will need to be programmed to activate LeakPlus functionality; see Section 9 of the manual for details.

6.13 Connecting power to the STi Plus unit

In standard configuration, the STi enclosure is supplied with a hole fitted with a M12 IP67 rated cable gland for the power supply cable to enter the enclosure. Use this cable gland to pass the power supply cable into the enclosure.

If the timer is to run on DC power, connect the power supply cables to the DC power in terminals on the master card. The voltage supplied to terminal J104 should be regulated at 24VDC.

If the timer is to run on AC power, connect the power supply cables to the AC power in terminals on the master card. Terminals on the modular power supply can accept single phase 110-240VAC power.

A protective earth should be connected in the earthing junction of Terminal J103 in all cases. Ensure the earth link is fitted in across JP1.

When solenoid valves are mounted in potentially hazardous areas, the earth connection to the solenoid valve bodies must be connected to the protective earth of the system. A residual charge device should be fitted to the power supply to the timer.

NOTICE

Equipment intended for deployment in hazardous areas should be selected and installed in compliance with AS/NZS 60079:14 and other relevant local regulations/ordinances.

The power supply cables should not exert any undue stress on the terminals. The use of multistrand conductors is advised. Ensure that the socket is fully engaged into the plug on the PCB.

⚠ WARNING

The STi Plus card internal power supply is rated to a maximum input voltage of 250VAC and can withstand a voltage spike of 0.5kVAC. If power is supplied outside of this range is applied, this will irreversibly damage the onboard circuitry. Provide suitable power regulation and spike protection equipment.

7 PNEUMATIC CONNECTION

The dust collector unit normally ships with the pneumatic tubing fitted at the factory with the exception of the Dalamatic Insertable dust collectors where these are site fitted.

On arrival of the dust collector to site, check pneumatic tubing between solenoid valve and diaphragm valves is securely fitted. The tubing should be fitted between the ports on either valve fitted with a push-fit connection.

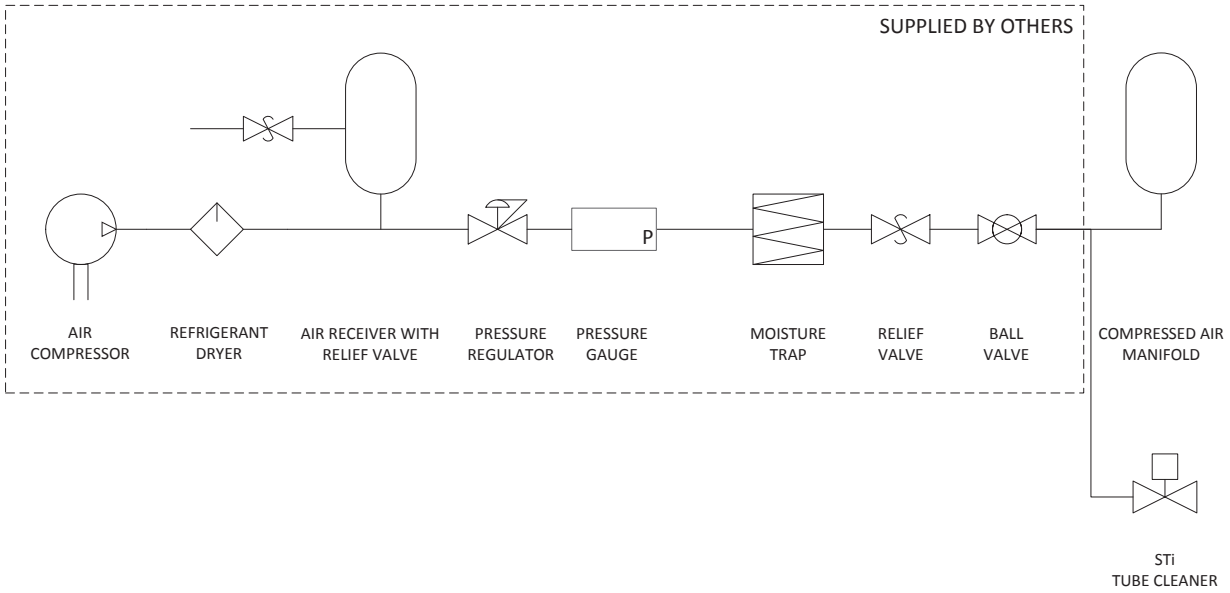


Figure 6: P&ID drawing showing the compressed air connection to the dust collector

7.1 Setting up the ODCTC unit

Verify pneumatic connections from bulkhead fittings on the enclosures to the pressure transducer on the master card are fitted correctly as per Donaldson drawing STi ODC TC Pneumatic Connections Rev B.

When adjusting the pressure relief valve, during system commissioning the pneumatic connection to the tube cleaner should be disconnected as the tube cleaner system is only rated to 7bar. Once the pressure relief valve has been set at under 7bar, the tube cleaner can be connected.

The new dust collection plant is supplied with 6m of pneumatic hose to connect the push-fit connections on the master timer enclosure to the pressure taps on the dust collector. Spare timers are not supplied with any hose. Lengths of hose can be separately ordered as required.

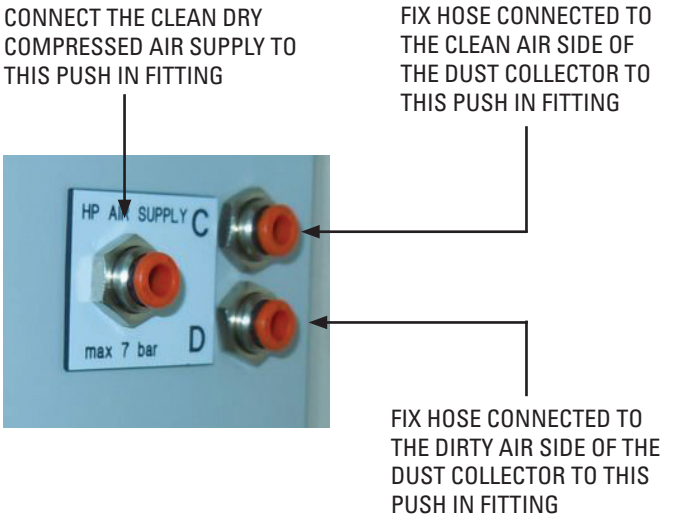


Figure 6: Push-In fittings affixed on the side of the STi Plus Master enclosure.

The connector marked as C should be connected to the clean side of the dust collector while the connector marked as D should be connected to the dirty side of the dust collector.

⚠ WARNING

If compressed air supply is connected to the C or D ports on the timer enclosure, this will cause irreversible damage to the dust collection plant.

8 GENERAL SITE OPERATION

The STi Plus timer generally comes pre-programmed from Donaldson customised with optimal pulse timing settings for the Donaldson dust collector that it is intended to be connected to. After installing the timer following the instructions in Section 2, switch on the power to the timer.

NOTICE

If the DIP switches on the extension cards have not been set up according to the guidelines mentioned in Section 6.2, the reverse jet pulse cleaning mechanism of the dust collector will not operate as designed.

The timer should power up and detect the extension cards connected and the configuration of these extension cards. Once power up self-test and reconfiguration is completed the timer should be ready to operate and displays the run screen.

From the run screens it is possible to quickly review the timer settings and identify when the dust collection system will need servicing. Whilst on these screens, it is possible to access screens where contact details of Donaldson Care are displayed.

After reviewing this information, the user can access the programming section of the timer code by inputting the correct passcode 004.

⚠ WARNING

Changing settings on the STi Plus timer can impact the efficiency of the reverse pulse jet cleaning system and may result in irreversible damage to the dust collection system. Donaldson DOES NOT recommend changing these settings after the system has been commissioned without consulting Donaldson Technical Services.

Once inside the programming mode, the user can reprogram the different variables governing the pulse timing algorithms. Tables 3 and 4 show the factory set values for the different variables.

Dust Collector Model	No. of valves being controlled	Pulse sequencing algorithm	Pulse duration	Interval between pulsing during normal pulsing
Dalamatic units DU 7, DU 10, DU 14 and DU 20	05	Standard	100 ms	25 sec
Dalamatic units DU 30 and DU 45	10	Standard	100 ms	12 sec
Dalamatic Cased Series DLMC, 1 bank units (1/2/15 to 1/8/15)	10	Standard	100 ms	12 sec
Dalamatic Cased Series DLMC, 2 bank units (2/2/15 to 2/8/15)	20	Standard	100 ms	12 sec
Dalamatic Cased Series DLMC, 3 bank units (3/2/15 to 3/8/15)	30	Standard	100 ms	12 sec
Dalamatic Cased Series DLMC, 4 bank units (4/2/15 to 4/8/15)	40	Standard	100 ms	12 sec
Dalamatic Insertable units, DLMV 4/7, DLMV 6/10, DLMV 8/7, DLMV 8/15, DLMV 9/15 and DLMV 12/10	03	Standard	100 ms	25 sec
Dalamatic Insertable units, DLMV 7/7, DLMV 10/10, DLMV 13/12, DLMV 14/7, DLMV 15/15 and DLMV 20/10*	05	Standard	100 ms	25 sec
Dalamatic Insertable units DLMV 21/7, DLMV 25/12 and DLMV 30/10, DLMV 30/15, DLMV 45/15, DLMV 50/12, DLMV 60/15 and DLMV 80/20	10	Standard	100 ms	12 sec
Siloair units, VS 10, VS 14, VS 15 and VS 21	02	Standard	100 ms	12 sec
Siloair units, VS 20 and VS 28	03	Standard	100 ms	12 sec
Torit, Series TD	03	Standard	100 ms	10 sec
DownFlo units DFO/DFE 2-4 and DFO/DFE 2-8	04	Standard	100 ms	10 sec
DownFlo units DFO/DFE 3-6 and DFO/DFE 3-12	06	Standard	100 ms	10 sec
DownFlo units DFO/DFE 3-18	09	Standard	100 ms	10 sec
DownFlo units DFO/DFE 3-24	12	Arbitrary	100 ms	10 sec
DownFlo units DFO/DFE 3-36	18	Arbitrary	100 ms	10 sec

* The DLMV 20-10 is available in single valve cleaning configuration, where the number of valves will be 10 (mirroring the dust collector itself).

Dust Collector Model	No. of valves being controlled	Pulse sequencing algorithm	Pulse duration	Interval between pulsing during normal pulsing
DownFlo units DFO/DFE 4-16	08	Standard	100 ms	10 sec
DownFlo units DFO/DFE 4-32	16	Arbitrary	100 ms	10 sec
DownFlo units DFO/DFE 4-48	24	Arbitrary	100 ms	10 sec
Powercore units CPV 1 and CPV 3	03	Standard	100 ms	10 sec
Powercore unit CPV 2	02	Standard	100 ms	10 sec
Powercore units CPV 4 and CPC 4	04	Standard	100 ms	10 sec
Powercore units CPC 6 and CPV 6	06	Standard	100 ms	10 sec
Powercore units CPC 8 and CPV 8	08	Standard	100 ms	10 sec
Powercore units CPC 12 and CPV 12	12	Standard	100 ms	10 sec
Powercore units CPC 16, CPC 24, CPC 32 and CPC 48	08	Standard	100 ms	10 sec
Powercore unit TG 4	04	Standard	100 ms	10 sec
Powercore unit TG 6	06	Standard	100 ms	10 sec
Powercore unit TG 8	08	Standard	100 ms	10 sec
Powercore unit TG 12	12	Arbitrary	100 ms	10 sec
Powercore units, VL/VH 1-4 and VL/VH 2-8	04	Standard	100 ms	15 sec
Powercore units, VL/VH 1-6, VL/VH 2-12 and VH 3-18	06	Standard	100 ms	15 sec
Powercore units, VL/VH 2-16 and VL/VH 3-24	08	Standard	100 ms	15 sec

Table 3.:Pulse Timing Configuration for different Donaldson dust collectors

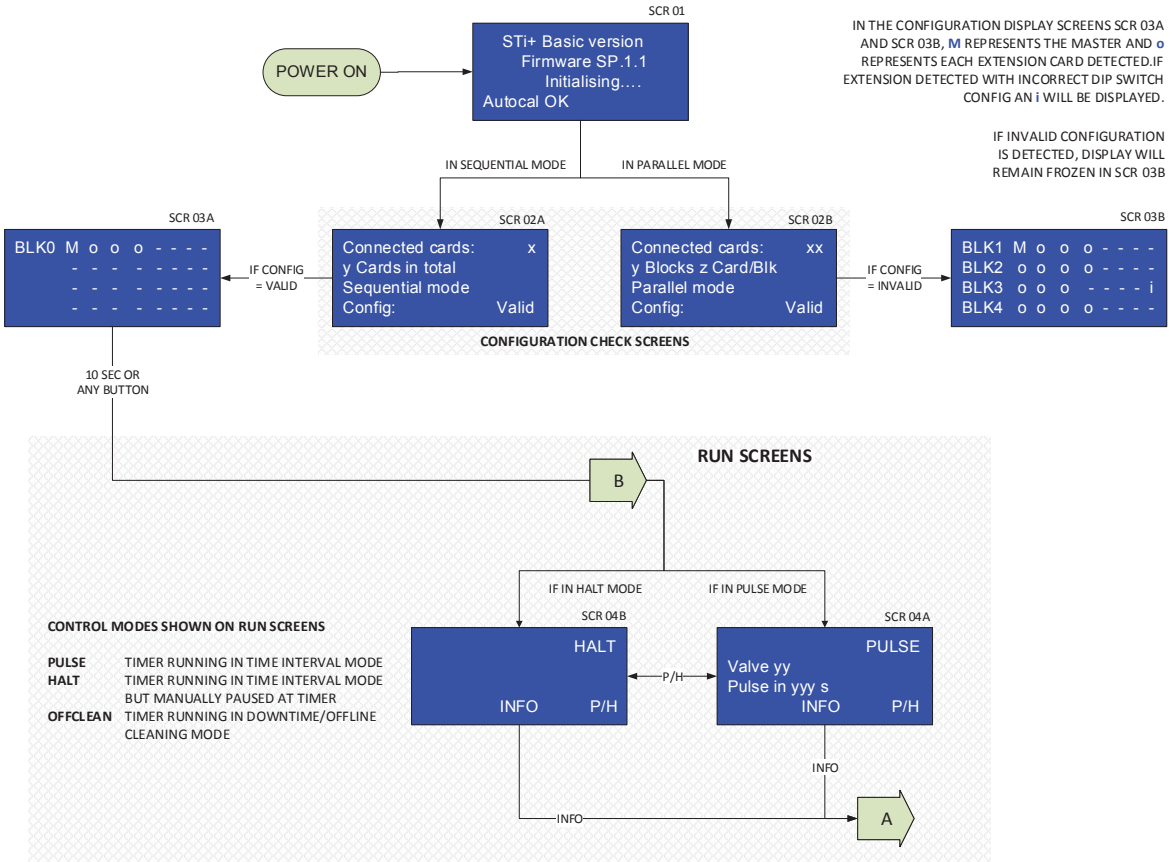
** If the dust collector has been issued with a record drawing, those settings supersede the ones mentioned here.

Collector Type	Dust Collector Range	ODC Low Set Point	ODC High Point	ODC High-high Set Point	ODC Alarm Set Point
Bag Collector	Dalamatic DU	90 mmWG 3.54 inWG 0.88 kPa	110 mmWG 4.33 inWG 1.08 kPa	130 mmWG 5.12 inWG 1.28 kPa	180 mmWG 7.08 inWG 1.77 kPa
	Dalamatic DLMC				
	Dalamatic DLMV				
Cartridge Collector	Siloair VS series	50 mmWG 1.97 inWG 0.49 kPa	75 mmWG 2.95 inWG 0.74 kPa	90 mmWG 3.54 inWG 0.88 kPa	180 mmWG 7.08 inWG 1.77 kPa
	TD series				
	DFO/DFE series				
Powercore Collector	CP series	50 mmWG 1.97 inWG 0.49 kPa	75 mmWG 2.95 inWG 0.74 kPa	90 mmWG 3.54 inWG 0.88 kPa	180 mmWG 7.08 inWG 1.77 kPa
	TG series				
	VH series				

Table 4: Recommended On Demand Cleaning settings for different Donaldson dust collectors

9 STi PLUS TIMER SCREEN MAPS

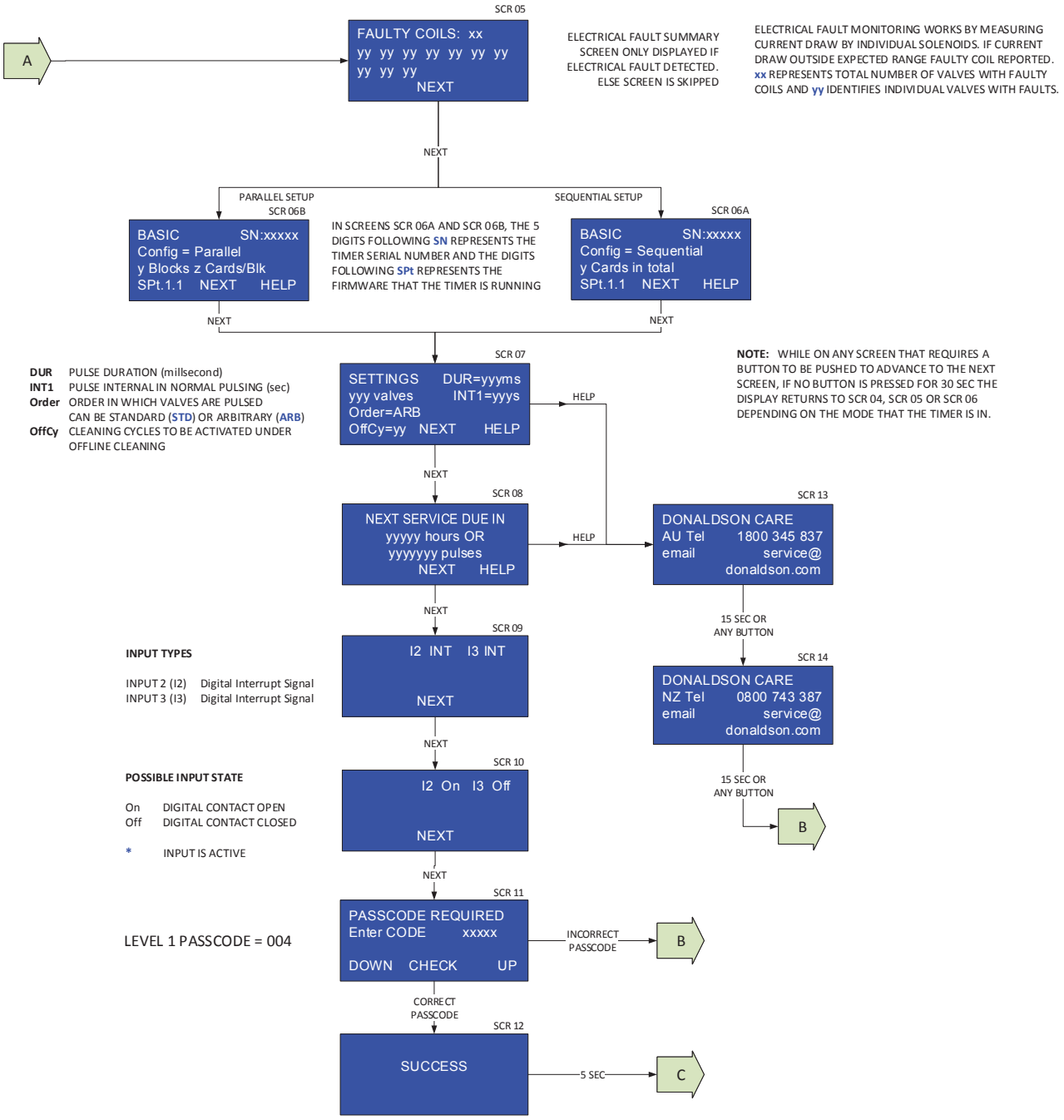
9.1 STi PLUS Basic Timer Screen Map

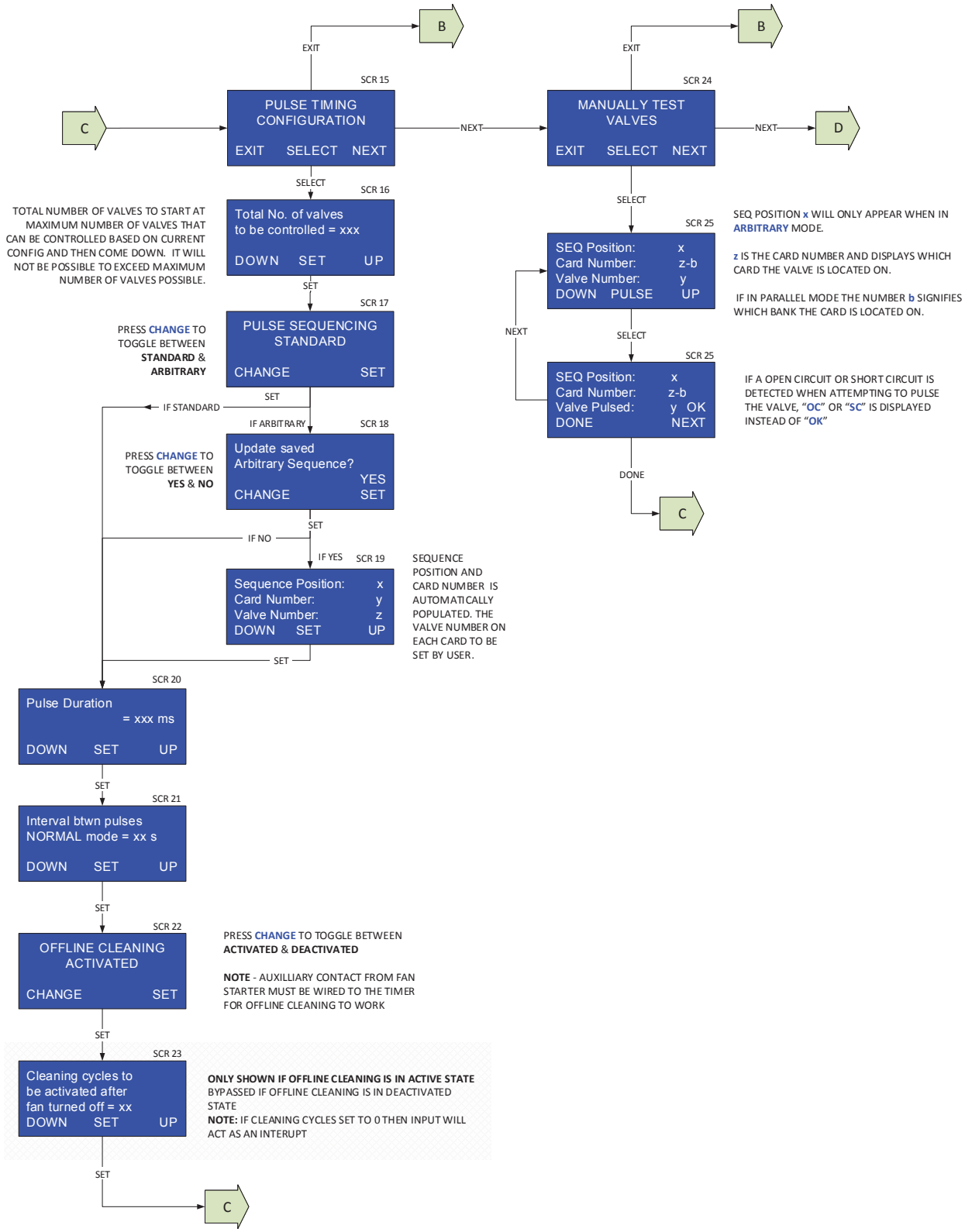


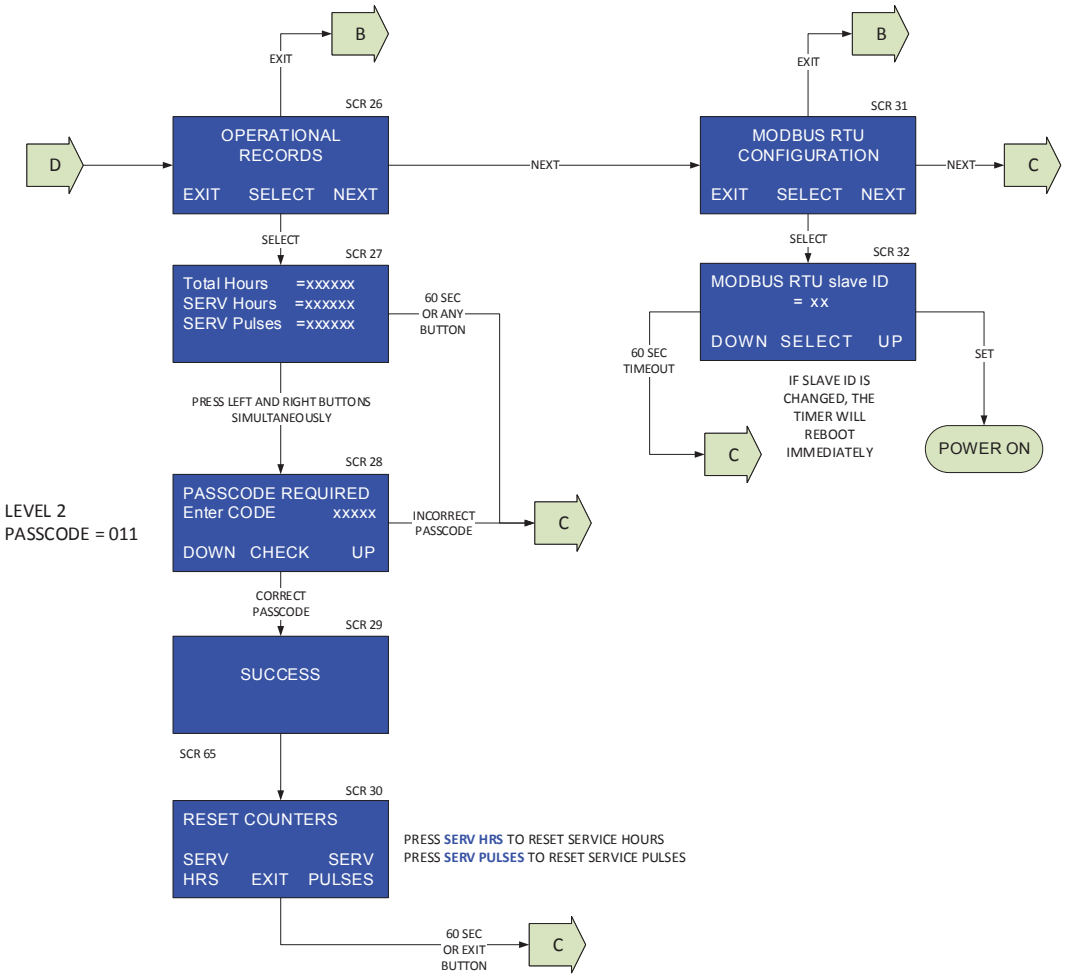
VARIATION OF RESTING RUN SCREEN DISPLAYS (SCR 04) FOR STi Plus BASIC VERSION

IF ANY OF THESE VARIANTS ARE DISPLAYED THE RUN SCREENS WILL CONTINUE TO FLASH TILL THE UNDERLYING CAUSE IS RESOLVED.

HALT INTERUPT SIGNAL ACTIVE ON INPUT x y INFO P/H	IF INPUT 2 OR 3 HAVE BEEN TRIGGERED AND PROMPT HAS BEEN ACKONWLEDGED THEN THE TIMER WILL READ "**INTERUPT SIGNAL ACTIVE ON INPUT x**" ON THE MAIN SCREEN. THERE WILL BE NO CHANGE IN THE OPERATING MODE OF THE TIMER.
PULSE Valve yy SC yy-xx Pulse in yyy s INFO P/H	IF A FAULT IS DETECTED, "**SC**" (SHORT CIRCUIT), "**OC**" (OPEN CIRCUIT) WILL BE SHOWN WITH THE FAULTY VALVE NUMBER **YY** AND CARD NUMBER **X** ON RIGHT SIDE UNDER THE MODE TEXT (**AUTO, PULSE, HALT** OR **OFFCLEAN**). IF IN SEQUENTIAL MODE, ONLY THE VALVE NUMBER IS SHOWN.
PULSE Valve yy Pulse in yyy SVC INFO P/H	IF THE SERVICE HOURS OR SERVICE COUNTERS HAVE BEEN EXCEEDED THEN THE TIMER WILL READ "**SVC**" ON RIGHT SIDE OF SCREEN THIRD ROW
PULSE Valve yy Pulse in yyy CVF INFO P/H	IF MULITPLE VALVES ON THE SYSTEM HAVE FAILED (CUMULATIVE VALVE FAILURE) TIMER WILL READ "**CVF**" ON RIGHT SIDE OF SCREEN THIRD ROW
OFFCLEAN Valve yy Pulse in yyy s INFO P/H	IF OFFLINE CLEANING HAS BEEN ACTIVATED AND THE FAN HAS STOPPED THEN CLEANUP MODE WILL BE TRIGGERED. TIMER WILL READ "**OFFCLEAN**" IN TOP RIGHT CORNER
OFFCLEAN OFFLINE CLEANING COMPLETE INFO P/H	WHEN OFFLINE CLEANING HAS BEEN COMPLETED THE TIMER WILL READ "**OFFLINE CLEANING COMPLETE**". THE UNIT WILL REMAIN IN **OFFCLEAN** MODE.


A
SCR 05
FAULTY COILS: xx
yy yy yy yy yy yy yy
yy yy yy
NEXT
ELECTRICAL FAULT SUMMARY SCREEN ONLY DISPLAYED IF ELECTRICAL FAULT DETECTED. ELSE SCREEN IS SKIPPED
ELECTRICAL FAULT MONITORING WORKS BY MEASURING CURRENT DRAW BY INDIVIDUAL SOLENOIDS. IF CURRENT DRAW OUTSIDE EXPECTED RANGE FAULTY COIL REPORTED. xx REPRESENTS TOTAL NUMBER OF VALVES WITH FAULTY COILS AND yy IDENTIFIES INDIVIDUAL VALVES WITH FAULTS.
NEXT
PARALLEL SETUP
SCR 06B
BASIC SN:xxxxx
Config = Parallel
y Blocks z Cards/Blk
SPt.1.1 NEXT HELP
IN SCREENS SCR 06A AND SCR 06B, THE 5 DIGITS FOLLOWING SN REPRESENTS THE TIMER SERIAL NUMBER AND THE DIGITS FOLLOWING SPt REPRESENTS THE FIRMWARE THAT THE TIMER IS RUNNING
SEQUENTIAL SETUP
SCR 06A
BASIC SN:xxxxx
Config = Sequential
y Cards in total
SPt.1.1 NEXT HELP
NEXT
NEXT
DUR PULSE DURATION (millsecond)
INT1 PULSE INTERNAL IN NORMAL PULSING (sec)
Order ORDER IN WHICH VALVES ARE PULSED CAN BE STANDARD (STD) OR ARBITRARY (ARB)
OffCy CLEANING CYCLES TO BE ACTIVATED UNDER OFFLINE CLEANING
SCR 07
SETTINGS DUR=yyyms
yyy valves INT1=yyys
Order=ARB
OffCy=yy NEXT HELP
HELP
NOTE: WHILE ON ANY SCREEN THAT REQUIRES A BUTTON TO BE PUSHED TO ADVANCE TO THE NEXT SCREEN, IF NO BUTTON IS PRESSED FOR 30 SEC THE DISPLAY RETURNS TO SCR 04, SCR 05 OR SCR 06 DEPENDING ON THE MODE THAT THE TIMER IS IN.
NEXT
SCR 08
NEXT SERVICE DUE IN
yyyyy hours OR
yyyyyyy pulses
NEXT HELP
HELP
SCR 13
DONALDSON CARE
AU Tel 1800 345 837
email service@
donaldson.com
15 SEC OR ANY BUTTON
SCR 14
DONALDSON CARE
NZ Tel 0800 743 387
email service@
donaldson.com
15 SEC OR ANY BUTTON
B
NEXT
SCR 09
I2 INT I3 INT
NEXT
INPUT TYPES
INPUT 2 (I2) Digital Interrupt Signal
INPUT 3 (I3) Digital Interrupt Signal
NEXT
SCR 10
I2 On I3 Off
NEXT
POSSIBLE INPUT STATE
On DIGITAL CONTACT OPEN
Off DIGITAL CONTACT CLOSED
* INPUT IS ACTIVE
NEXT
SCR 11
PASSCODE REQUIRED
Enter CODE xxxxx
DOWN CHECK UP
INCORRECT PASSCODE
B
LEVEL 1 PASSCODE = 004
CORRECT PASSCODE
SCR 12
SUCCESS
5 SEC
C


B
EXIT
SCR 15
PULSE TIMING CONFIGURATION
EXIT SELECT NEXT
C
NEXT
SELECT
SCR 16
Total No. of valves to be controlled = xxx
DOWN SET UP
SET
SCR 17
PULSE SEQUENCING STANDARD
CHANGE SET
SET
IF STANDARD
IF ARBITRARY
SCR 18
Update saved Arbitrary Sequence?
YES
CHANGE SET
SET
IF NO
IF YES
SCR 19
Sequence Position: x
Card Number: y
Valve Number: z
DOWN SET UP
SET
SCR 20
Pulse Duration = xxx ms
DOWN SET UP
SET
SCR 21
Interval btwn pulses NORMAL mode = xx s
DOWN SET UP
SET
SCR 22
OFFLINE CLEANING ACTIVATED
CHANGE SET
SET
SCR 23
Cleaning cycles to be activated after fan turned off = xx
DOWN SET UP
SET
C
TOTAL NUMBER OF VALVES TO START AT MAXIMUM NUMBER OF VALVES THAT CAN BE CONTROLLED BASED ON CURRENT CONFIG AND THEN COME DOWN. IT WILL NOT BE POSSIBLE TO EXCEED MAXIMUM NUMBER OF VALVES POSSIBLE.
PRESS CHANGE TO TOGGLE BETWEEN STANDARD & ARBITRARY
PRESS CHANGE TO TOGGLE BETWEEN YES & NO
SEQUENCE POSITION AND CARD NUMBER IS AUTOMATICALLY POPULATED. THE VALVE NUMBER ON EACH CARD TO BE SET BY USER.
PRESS CHANGE TO TOGGLE BETWEEN ACTIVATED & DEACTIVATED
NOTE - AUXILLIARY CONTACT FROM FAN STARTER MUST BE WIRED TO THE TIMER FOR OFFLINE CLEANING TO WORK
ONLY SHOWN IF OFFLINE CLEANING IS IN ACTIVE STATE
BYPASSED IF OFFLINE CLEANING IS IN DEACTIVATED STATE
NOTE: IF CLEANING CYCLES SET TO 0 THEN INPUT WILL ACT AS AN INTERUPT
B
EXIT
SCR 24
MANUALLY TEST VALVES
EXIT SELECT NEXT
NEXT
D
SELECT
SCR 25
SEQ Position: x
Card Number: z-b
Valve Number: y
DOWN PULSE UP
NEXT
SELECT
SCR 25
SEQ Position: x
Card Number: z-b
Valve Pulsed: y OK
DONE NEXT
DONE
C
SEQ POSITION x WILL ONLY APPEAR WHEN IN ARBITRARY MODE.
z IS THE CARD NUMBER AND DISPLAYS WHICH CARD THE VALVE IS LOCATED ON.
IF IN PARALLEL MODE THE NUMBER b SIGNIFIES WHICH BANK THE CARD IS LOCATED ON.
IF A OPEN CIRCUIT OR SHORT CIRCUIT IS DETECTED WHEN ATTEMPTING TO PULSE THE VALVE, "OC" OR "SC" IS DISPLAYED INSTEAD OF "OK"



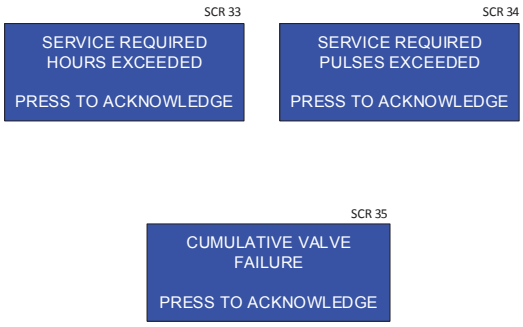
TOTAL HOURS – THE TOTAL NUMBER OF HOURS THE UNIT HAS BEEN POWERED UP WITH THE FAN RUNNING (IE. NOT IN OFFLINE CLEANING MODE)

SERV HOURS – THE TOTAL NUMBER OF HOURS THE UNIT HAS BEEN POWERED UP WITH THE FAN RUNNING (IE. NOT IN OFFLINE CLEANING MODE) SINCE THE LAST SERVICE/RESET

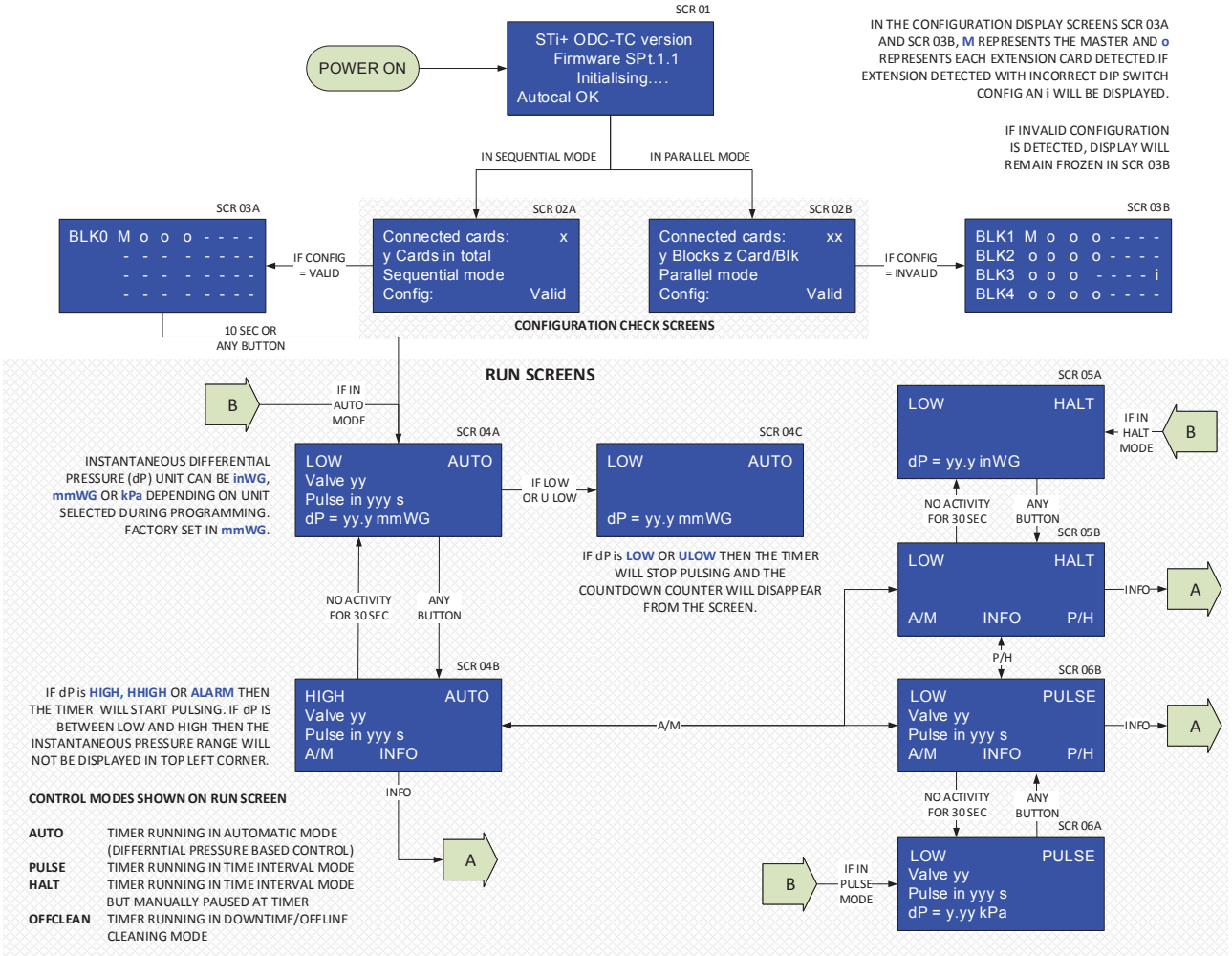
SERV PULSES – THE TOTAL NUMBER OF INDIVIDUAL SOLENOID VALVE PULSES SINCE THE LAST SERVICE/RESET

NOTICE

After ALL the event notifications are acknowledged, the Timer will return to the run screens in normal operation. However, if the event trigger is not resolved the notification will come back on after 10 minutes. This will keep on occurring till the issue is addressed.



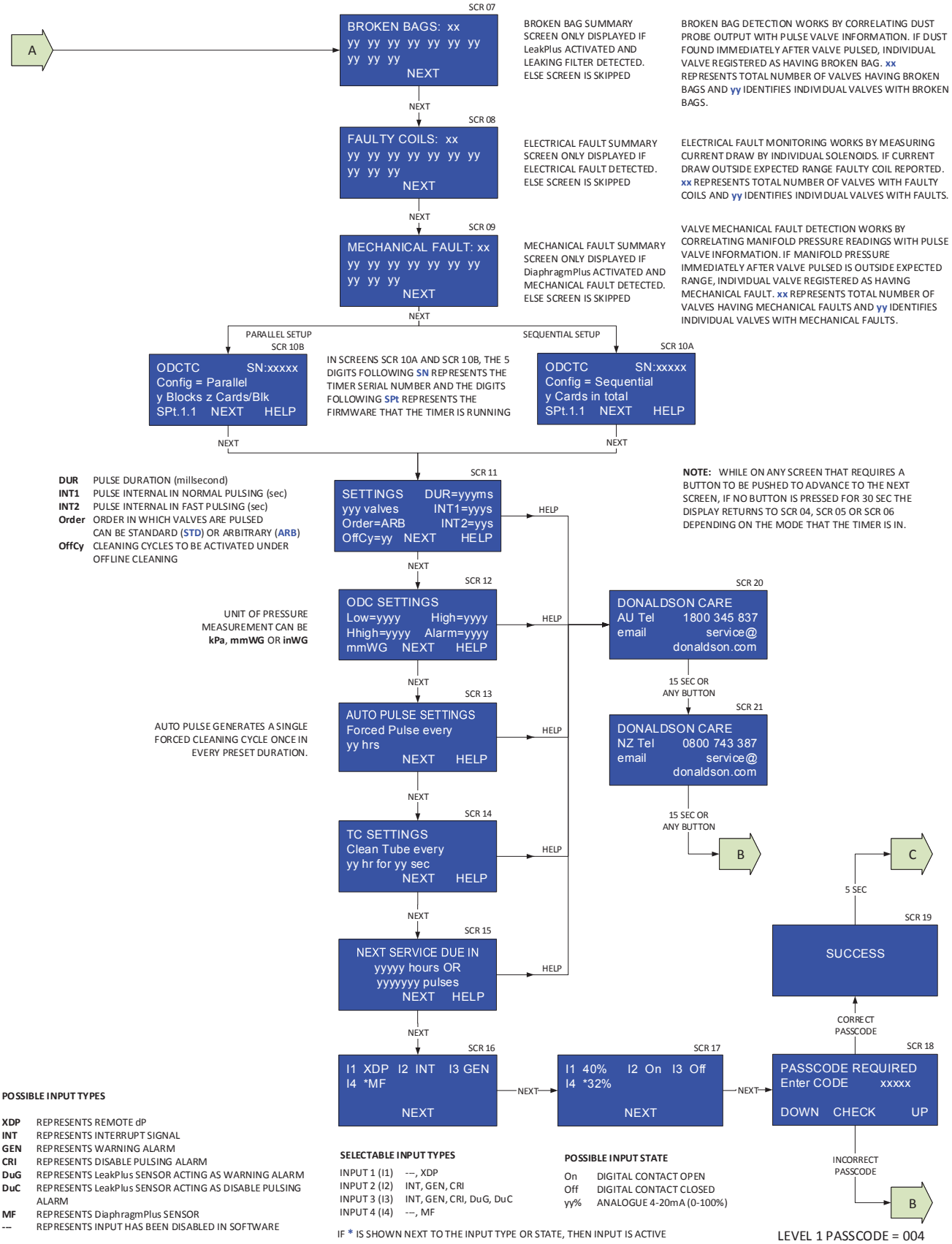
9.2 STi PLUS ODCTC Timer Screen Map



VARIATION OF RESTING RUN SCREEN DISPLAYS (SCR 04A, SCR 05A AND SCR 06A) FOR STi Plus ODCTC VERSION

SIMILAR VARIATION OCCUR ON AWAKE RUN SCREEN DISPLAYS (SCR 04B, SCR 04C, SCR 05B AND SCR 06B)

HIGH A2 A3 AUTO Valve yy Pulse in yyy s dP = yy.y inWG	IF INPUT 2 OR 3 HAVE BEEN SET AS A WARNING ALARM OR DUST PROBE AND INPUT HAS BEEN TRIGGERED AND PROMPT HAS BEEN ACKNOWLEDGED THEN "A2" OR "A3" WILL APPEAR ON THE TOP ROW. THE UNIT WILL CONTINUE TO PULSE. THERE WILL BE NO CHANGE IN THE OPERATING MODE OF THE TIMER.
HIGH A2 A3 AUTO CRITICAL ALARM ACTIVE ON INPUT x y dP = yy.y inWG	IF INPUT 2 OR 3 HAVE BEEN SET AS A CRITICAL ALARM OR DUST PROBE AND INPUT HAS BEEN TRIGGERED THEN "A2" OR "A3" WILL APPEAR ON THE TOP ROW AFTER THE PROMPT HAS BEEN ACKNOWLEDGED. THE UNIT WILL STOP PULSING. THERE WILL BE NO CHANGE IN THE OPERATING MODE OF THE TIMER.
HIGH PULSE INTERUPT SIGNAL ACTIVE ON INPUT x y dP = y.yy kPa	IF INPUT 2 OR 3 HAVE BEEN TRIGGERED AND PROMPT HAS BEEN ACKONWLEDGED THEN THE TIMER WILL READ "INTERUPT SIGNAL ACTIVE ON INPUT x" ON THE MAIN SCREEN. THERE WILL BE NO CHANGE IN THE OPERATING MODE OF THE TIMER.
HIGH AUTO Valve yy SC yy-xx Pulse in yyy s dP = yy.y inWG	IF A FAULT IS DETECTED, "SC" (SHORT CIRCUIT), "OC" (OPEN CIRCUIT) WILL BE SHOWN WITH THE FAULTY VALVE NUMBER yy AND CARD NUMBER x ON RIGHT SIDE UNDER THE MODE TEXT (AUTO, PULSE, HALT OR OFFCLEAN). IF IN SEQUENTIAL MODE, ONLY THE VALVE NUMBER IS SHOWN.
HIGH AUTO Valve yy Pulse in yyy SVC dP = yyy mmWG	IF THE SERVICE HOURS OR SERVICE COUNTERS HAVE BEEN EXCEEDED THEN THE TIMER READS "SVC"
HIGH AUTO Valve yy Pulse in yyy CVF dP = yy.y inWG	IF MULITPLE VALVES ON THE SYSTEM HAVE FAILED (CUMULATIVE VALVE FAILURE) TIMER WILL READ "CVF" ON RIGHT SIDE OF SCREEN THIRD ROW
ULOW OFFCLEAN Valve yy Pulse in yyy s dP = yy.y inWG	IF OFFLINE CLEANING HAS BEEN ACTIVATED AND THE FAN HAS STOPPED THEN CLEANUP MODE WILL BE TRIGGERED. TIMER WILL READ "OFFCLEAN" IN TOP RIGHT CORNER
ULOW OFFCLEAN OFFLINE CLEANING COMPLETE dP = yy.y inWG	WHEN OFFLINE CLEANING HAS BEEN COMPLETED THE TIMER WILL READ "OFFLINE CLEANING COMPLETED". THE UNIT WILL REMAIN IN OFFCLEAN MODE.
HIGH PULSE Valve yy Pulse in yyy s XdP = yyy mmWG	IF INPUT 1 IS ACTIVATED AND BEING USED AS AN EXTERNAL DIFFERENTIAL PRESSURE SENSOR THEN "XdP" WILL BE SHOWN IN LOWER LEFT HAND CORNER.
HIGH PULSE REMOTE INTERRUPT BY MODBUS ACTIVE dP = yy.y inWG	IF AN INTERRUPT ORDER IS ISSUED THROUGH MODBUS THEN THE TIMER WILL READ "REMOTE INTERRUPT BY MODBUS" ON THE MAIN SCREEN. THE UNIT WILL STOP PULSING. THERE WILL BE NO CHANGE IN THE OPERATING MODE OF THE TIMER.



BROKEN BAG SUMMARY SCREEN ONLY DISPLAYED IF LeakPlus ACTIVATED AND LEAKING FILTER DETECTED. ELSE SCREEN IS SKIPPED

BROKEN BAG DETECTION WORKS BY CORRELATING DUST PROBE OUTPUT WITH PULSE VALVE INFORMATION. IF DUST FOUND IMMEDIATELY AFTER VALVE PULSED, INDIVIDUAL VALVE REGISTERED AS HAVING BROKEN BAG. **xx** REPRESENTS TOTAL NUMBER OF VALVES HAVING BROKEN BAGS AND **yy** IDENTIFIES INDIVIDUAL VALVES WITH BROKEN BAGS.

ELECTRICAL FAULT SUMMARY SCREEN ONLY DISPLAYED IF ELECTRICAL FAULT DETECTED. ELSE SCREEN IS SKIPPED

ELECTRICAL FAULT MONITORING WORKS BY MEASURING CURRENT DRAW BY INDIVIDUAL SOLENOIDS. IF CURRENT DRAW OUTSIDE EXPECTED RANGE FAULTY COIL REPORTED. **xx** REPRESENTS TOTAL NUMBER OF VALVES WITH FAULTY COILS AND **yy** IDENTIFIES INDIVIDUAL VALVES WITH FAULTS.

MECHANICAL FAULT SUMMARY SCREEN ONLY DISPLAYED IF DiaphragmPlus ACTIVATED AND MECHANICAL FAULT DETECTED. ELSE SCREEN IS SKIPPED

VALVE MECHANICAL FAULT DETECTION WORKS BY CORRELATING MANIFOLD PRESSURE READINGS WITH PULSE VALVE INFORMATION. IF MANIFOLD PRESSURE IMMEDIATELY AFTER VALVE PULSED IS OUTSIDE EXPECTED RANGE, INDIVIDUAL VALVE REGISTERED AS HAVING MECHANICAL FAULT. **xx** REPRESENTS TOTAL NUMBER OF VALVES HAVING MECHANICAL FAULTS AND **yy** IDENTIFIES INDIVIDUAL VALVES WITH MECHANICAL FAULTS.

IN SCREENS SCR 10A AND SCR 10B, THE 5 DIGITS FOLLOWING **SN** REPRESENTS THE TIMER SERIAL NUMBER AND THE DIGITS FOLLOWING **SPt** REPRESENTS THE FIRMWARE THAT THE TIMER IS RUNNING

DUR PULSE DURATION (millsecond)
INT1 PULSE INTERNAL IN NORMAL PULSING (sec)
INT2 PULSE INTERNAL IN FAST PULSING (sec)
Order ORDER IN WHICH VALVES ARE PULSED CAN BE STANDARD (**STD**) OR ARBITRARY (**ARB**)
OffCy CLEANING CYCLES TO BE ACTIVATED UNDER OFFLINE CLEANING

UNIT OF PRESSURE MEASUREMENT CAN BE **kPa**, **mmWG** OR **inWG**

AUTO PULSE GENERATES A SINGLE FORCED CLEANING CYCLE ONCE IN EVERY PRESET DURATION.

NOTE: WHILE ON ANY SCREEN THAT REQUIRES A BUTTON TO BE PUSHED TO ADVANCE TO THE NEXT SCREEN, IF NO BUTTON IS PRESSED FOR 30 SEC THE DISPLAY RETURNS TO SCR 04, SCR 05 OR SCR 06 DEPENDING ON THE MODE THAT THE TIMER IS IN.

POSSIBLE INPUT TYPES

XDP REPRESENTS REMOTE dP
INT REPRESENTS INTERRUPT SIGNAL
GEN REPRESENTS WARNING ALARM
CRI REPRESENTS DISABLE PULSING ALARM
DuG REPRESENTS LeakPlus SENSOR ACTING AS WARNING ALARM
DuC REPRESENTS LeakPlus SENSOR ACTING AS DISABLE PULSING ALARM
MF REPRESENTS DiaphragmPlus SENSOR
--- REPRESENTS INPUT HAS BEEN DISABLED IN SOFTWARE

SELECTABLE INPUT TYPES

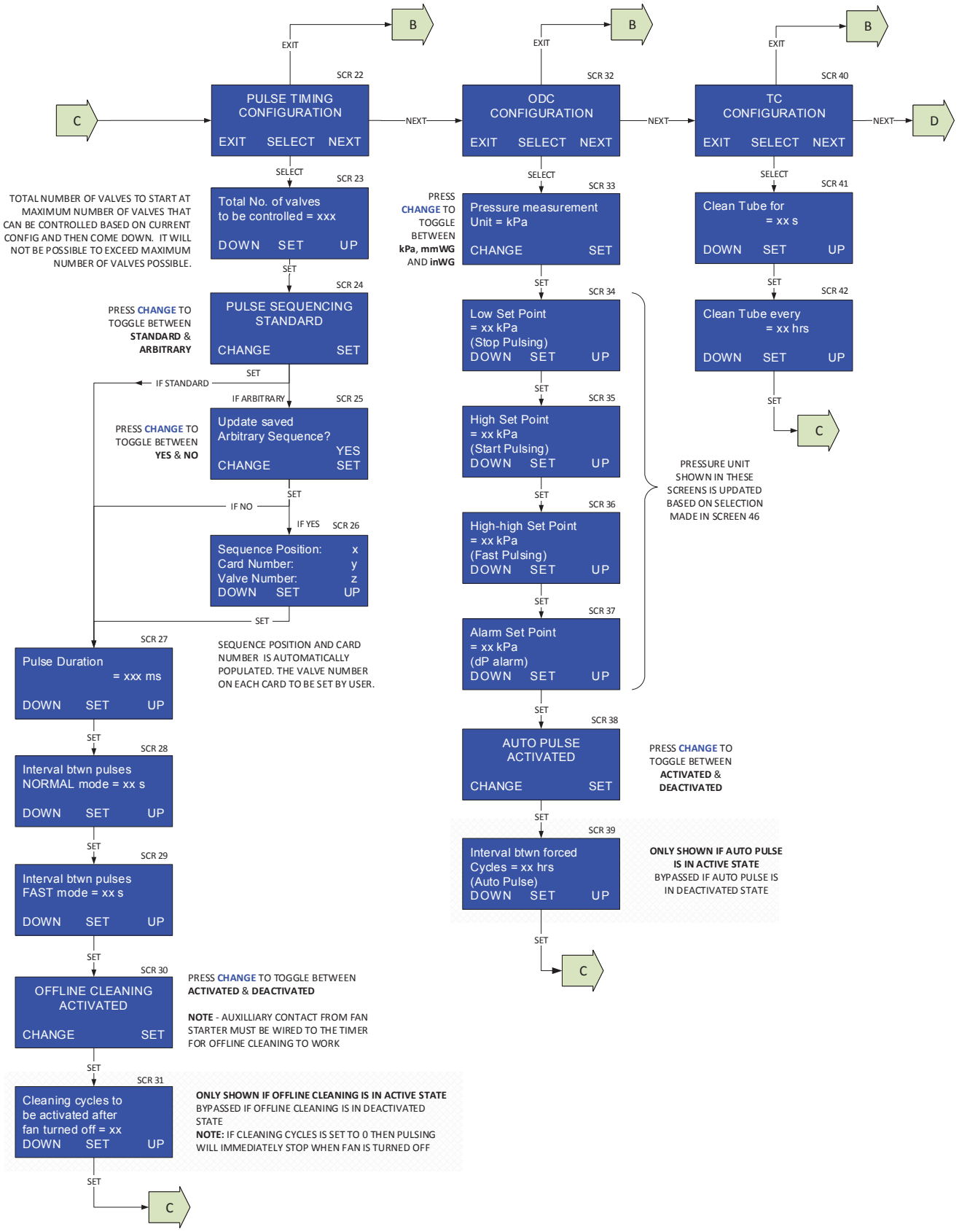
INPUT 1 (I1) ---, XDP
INPUT 2 (I2) INT, GEN, CRI
INPUT 3 (I3) INT, GEN, CRI, DuG, DuC
INPUT 4 (I4) ---, MF

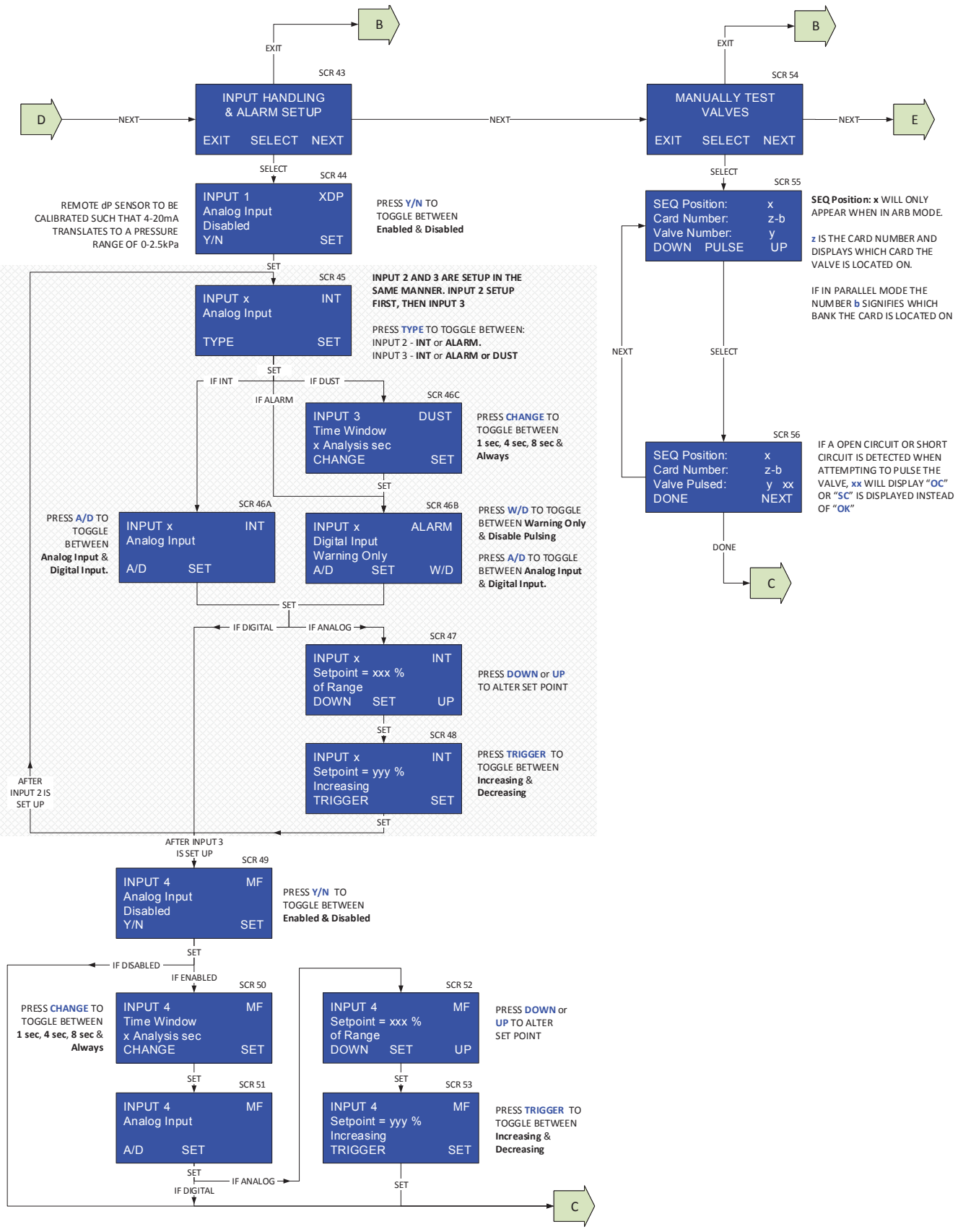
POSSIBLE INPUT STATE

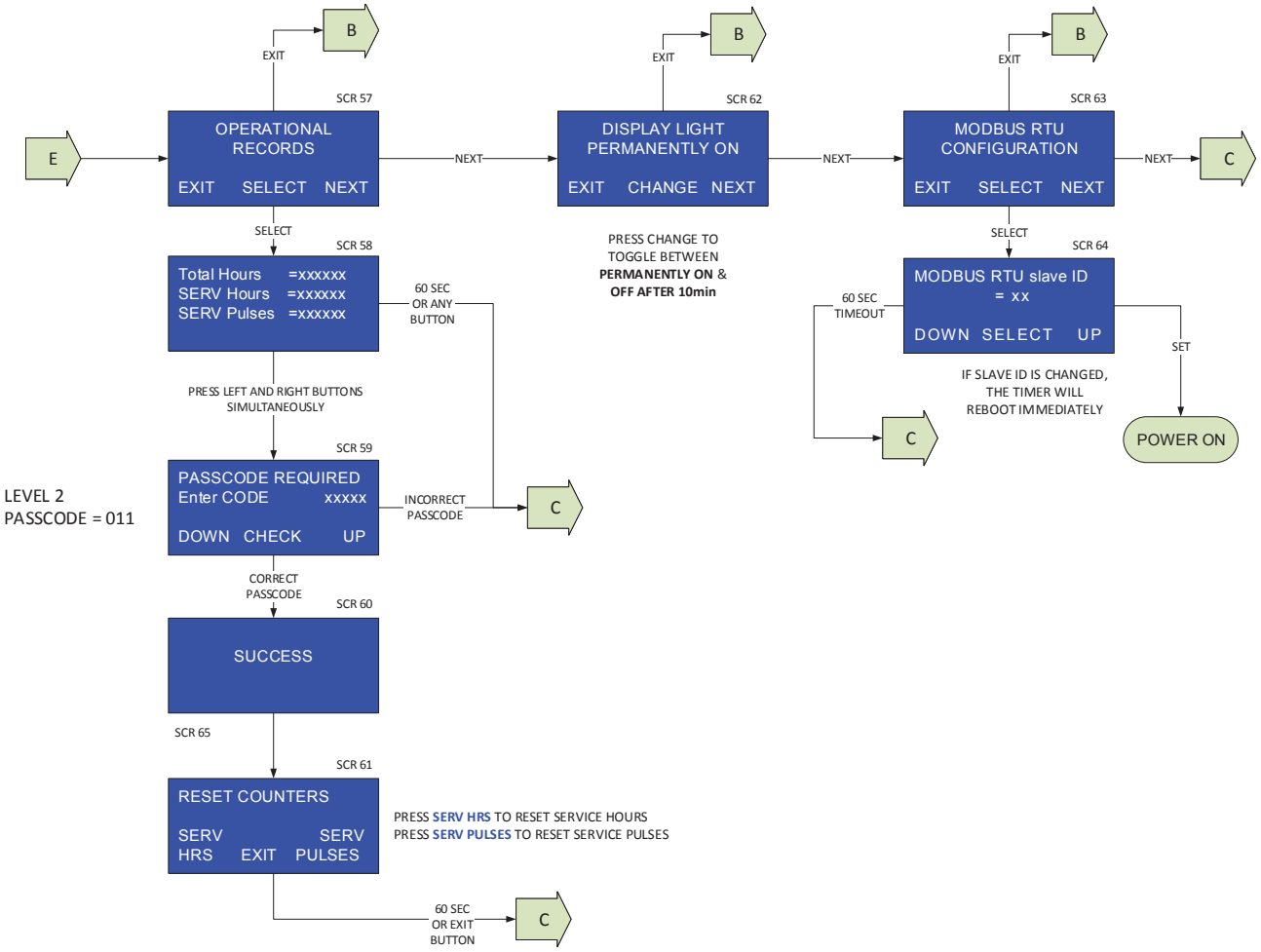
On DIGITAL CONTACT OPEN
Off DIGITAL CONTACT CLOSED
yy% ANALOGUE 4-20mA (0-100%)

IF * IS SHOWN NEXT TO THE INPUT TYPE OR STATE, THEN INPUT IS ACTIVE

LEVEL 1 PASSCODE = 004


C
SCR 22
PULSE TIMING CONFIGURATION
EXIT SELECT NEXT
EXIT
B
NEXT
SELECT
SCR 23
Total No. of valves to be controlled = xxx
DOWN SET UP
TOTAL NUMBER OF VALVES TO START AT MAXIMUM NUMBER OF VALVES THAT CAN BE CONTROLLED BASED ON CURRENT CONFIG AND THEN COME DOWN. IT WILL NOT BE POSSIBLE TO EXCEED MAXIMUM NUMBER OF VALVES POSSIBLE.
SET
SCR 24
PULSE SEQUENCING STANDARD
CHANGE SET
PRESS CHANGE TO TOGGLE BETWEEN STANDARD & ARBITRARY
SET
IF STANDARD
IF ARBITRARY
SCR 25
Update saved Arbitrary Sequence?
YES
CHANGE SET
PRESS CHANGE TO TOGGLE BETWEEN YES & NO
SET
IF NO
IF YES
SCR 26
Sequence Position: x
Card Number: y
Valve Number: z
DOWN SET UP
SET
SEQUENCE POSITION AND CARD NUMBER IS AUTOMATICALLY POPULATED. THE VALVE NUMBER ON EACH CARD TO BE SET BY USER.
SCR 27
Pulse Duration = xxx ms
DOWN SET UP
SET
SCR 28
Interval btwn pulses NORMAL mode = xx s
DOWN SET UP
SET
SCR 29
Interval btwn pulses FAST mode = xx s
DOWN SET UP
SET
SCR 30
OFFLINE CLEANING ACTIVATED
CHANGE SET
PRESS CHANGE TO TOGGLE BETWEEN ACTIVATED & DEACTIVATED
NOTE - AUXILLIARY CONTACT FROM FAN STARTER MUST BE WIRED TO THE TIMER FOR OFFLINE CLEANING TO WORK
SET
SCR 31
Cleaning cycles to be activated after fan turned off = xx
DOWN SET UP
ONLY SHOWN IF OFFLINE CLEANING IS IN ACTIVE STATE
BYPASSED IF OFFLINE CLEANING IS IN DEACTIVATED STATE
NOTE: IF CLEANING CYCLES IS SET TO 0 THEN PULSING WILL IMMEDIATELY STOP WHEN FAN IS TURNED OFF
SET
C
SCR 32
ODC CONFIGURATION
EXIT SELECT NEXT
EXIT
B
NEXT
SELECT
SCR 33
Pressure measurement Unit = kPa
CHANGE SET
PRESS CHANGE TO TOGGLE BETWEEN kPa, mmWG AND inWG
SET
SCR 34
Low Set Point = xx kPa (Stop Pulsing)
DOWN SET UP
SET
SCR 35
High Set Point = xx kPa (Start Pulsing)
DOWN SET UP
SET
SCR 36
High-high Set Point = xx kPa (Fast Pulsing)
DOWN SET UP
SET
SCR 37
Alarm Set Point = xx kPa (dP alarm)
DOWN SET UP
PRESSURE UNIT SHOWN IN THESE SCREENS IS UPDATED BASED ON SELECTION MADE IN SCREEN 46
SET
SCR 38
AUTO PULSE ACTIVATED
CHANGE SET
PRESS CHANGE TO TOGGLE BETWEEN ACTIVATED & DEACTIVATED
SET
SCR 39
Interval btwn forced Cycles = xx hrs (Auto Pulse)
DOWN SET UP
ONLY SHOWN IF AUTO PULSE IS IN ACTIVE STATE
BYPASSED IF AUTO PULSE IS IN DEACTIVATED STATE
SET
C
SCR 40
TC CONFIGURATION
EXIT SELECT NEXT
EXIT
B
NEXT
D
SELECT
SCR 41
Clean Tube for = xx s
DOWN SET UP
SET
SCR 42
Clean Tube every = xx hrs
DOWN SET UP
SET
C


D
NEXT
SCR 43
INPUT HANDLING & ALARM SETUP
EXIT SELECT NEXT
EXIT
B
NEXT
SCR 54
MANUALLY TEST VALVES
EXIT SELECT NEXT
NEXT
E
SELECT
SCR 44
INPUT 1 XDP
Analog Input
Disabled
Y/N SET
REMOTE dP SENSOR TO BE CALIBRATED SUCH THAT 4-20mA TRANSLATES TO A PRESSURE RANGE OF 0-2.5kPa
PRESS Y/N TO TOGGLE BETWEEN Enabled & Disabled
SET
SCR 45
INPUT x INT
Analog Input
TYPE SET
INPUT 2 AND 3 ARE SETUP IN THE SAME MANNER. INPUT 2 SETUP FIRST, THEN INPUT 3
PRESS TYPE TO TOGGLE BETWEEN:
INPUT 2 - INT or ALARM.
INPUT 3 - INT or ALARM or DUST
SET
IF INT
IF DUST
IF ALARM
SCR 46C
INPUT 3 DUST
Time Window
x Analysis sec
CHANGE SET
PRESS CHANGE TO TOGGLE BETWEEN 1 sec, 4 sec, 8 sec & Always
SET
SCR 46A
INPUT x INT
Analog Input
A/D SET
SCR 46B
INPUT x ALARM
Digital Input
Warning Only
A/D SET W/D
PRESS A/D TO TOGGLE BETWEEN Analog Input & Digital Input.
PRESS W/D TO TOGGLE BETWEEN Warning Only & Disable Pulsing
PRESS A/D TO TOGGLE BETWEEN Analog Input & Digital Input.
SET
IF DIGITAL
IF ANALOG
SCR 47
INPUT x INT
Setpoint = xxx %
of Range
DOWN SET UP
PRESS DOWN or UP TO ALTER SET POINT
SET
SCR 48
INPUT x INT
Setpoint = yyy %
Increasing
TRIGGER SET
PRESS TRIGGER TO TOGGLE BETWEEN Increasing & Decreasing
SET
AFTER INPUT 2 IS SET UP
AFTER INPUT 3 IS SET UP
SCR 49
INPUT 4 MF
Analog Input
Disabled
Y/N SET
PRESS Y/N TO TOGGLE BETWEEN Enabled & Disabled
SET
IF DISABLED
IF ENABLED
SCR 50
INPUT 4 MF
Time Window
x Analysis sec
CHANGE SET
PRESS CHANGE TO TOGGLE BETWEEN 1 sec, 4 sec, 8 sec & Always
SET
SCR 51
INPUT 4 MF
Analog Input
A/D SET
SET
IF ANALOG
IF DIGITAL
SCR 52
INPUT 4 MF
Setpoint = xxx %
of Range
DOWN SET UP
PRESS DOWN or UP TO ALTER SET POINT
SET
SCR 53
INPUT 4 MF
Setpoint = yyy %
Increasing
TRIGGER SET
PRESS TRIGGER TO TOGGLE BETWEEN Increasing & Decreasing
SET
C
SELECT
SCR 55
SEQ Position: x
Card Number: z-b
Valve Number: y
DOWN PULSE UP
SEQ Position: x WILL ONLY APPEAR WHEN IN ARB MODE.
z IS THE CARD NUMBER AND DISPLAYS WHICH CARD THE VALVE IS LOCATED ON.
IF IN PARALLEL MODE THE NUMBER b SIGNIFIES WHICH BANK THE CARD IS LOCATED ON
NEXT
SELECT
SCR 56
SEQ Position: x
Card Number: z-b
Valve Pulsed: y xx
DONE NEXT
IF A OPEN CIRCUIT OR SHORT CIRCUIT IS DETECTED WHEN ATTEMPTING TO PULSE THE VALVE, xx WILL DISPLAY "OC" OR "SC" IS DISPLAYED INSTEAD OF "OK"
DONE
C



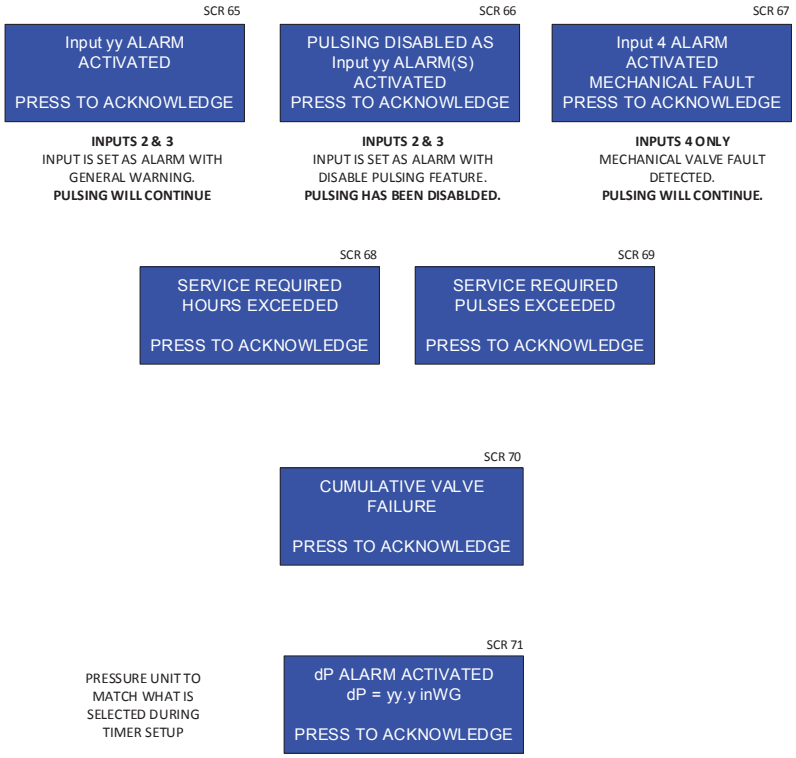
TOTAL HOURS – THE TOTAL NUMBER OF HOURS THE UNIT HAS BEEN POWERED UP WITH THE FAN RUNNING (IE. NOT IN OFFLINE CLEANING MODE)

SERV HOURS – THE TOTAL NUMBER OF HOURS THE UNIT HAS BEEN POWERED UP WITH THE FAN RUNNING (IE. NOT IN OFFLINE CLEANING MODE) SINCE THE LAST SERVICE/RESET

SERV PULSES – THE TOTAL NUMBER OF INDIVIDUAL SOLENOID VALVE PULSES SINCE THE LAST SERVICE/RESET

NOTICE

After ALL the event notifications are acknowledged, the Timer will return to the run screens in normal operation. However, if the event trigger is not resolved the notification will come back on after 10 minutes. This will keep on occurring till the issue is addressed.



10 TROUBLESHOOTING

Problem	Probable Cause	Remedy
Timer does not turn on	Power supply to the timer has been interrupted	Check that the input power supply to the timer is active and at the rated voltage
	The timer has not been wired correctly	Verify that the cable connection on terminal J104 (if using 24VDC power) or terminal J103 (if using 110-240VAC power) is secure.
	The timer has been damaged due to internal failure	The timer card needs to be replaced. Be sure to quote the serial number and the details from the QC sticker on the timer to expedite processing.
An INVALID configuration error message is displayed after the timer is turned on	The timer is unable to communicate with all the extension cards that it should be controlling based on the saved settings	Review DIP switch configuration on the extension cards. Ensure that these are set up as described in Section 6.2 of this manual.
		Check that the CAT5 cable connecting the extension cards to the master card is securely fixed at either end.
		Check the integrity of the CAT5 cable. Replace cable if necessary.
		The timer card needs to be replaced. Be sure to quote the serial number and the details from the QC sticker on the timer to expedite processing.
Timer pulses immediately after powering on but does not pulse valves after a while	The bridge between the contacts of terminal J202 have been removed and no connection has been made to the normally closed auxiliary terminals of the fan starter.	Temporarily disable Offline Cleaning in the timer settings. Turn off the timer and restart it after waiting for a minimum 90 sec. If the timer functions correctly, ensure that the connection between the auxiliary contacts of the fan starter and the master card. Then reactivate Offline Cleaning in the timer settings.
		If it is not intended to use the Offline Cleaning feature, install a bridge across the contacts of terminal J202.
	Compressed air manifold is being starved; the compressor is undersized	Verify compressor rating and that it is working. Check supply lines for leaks.

Problem	Probable Cause	Remedy
Valves are not pulsing	Power supply to the timer has been interrupted	Check that the power supply to the timer is active and at the rated voltage
	Low voltage power supply to the timer	Check the voltage at which power is being supplied to the timer. A low voltage may be able to operate the LED display but will not be sufficient to operate the valves correctly
	DIP switches have not been correctly set	Check that the DIP switches have been pushed fully to the extremities of their moulding.
		Verify that the DIP switches have been set in accordance with the examples shown in Section 6.2.
	Timer cards have not been wired correctly	Verify that the cable connection on terminal J104 (if using 24VDC power) or terminal J103 (if using 110-240VAC power) is secure.
		Check that the CAT5 cable connecting the extension cards to the master card is securely fixed at either end.
		Check the integrity of the CAT5 cable. Replace cable if necessary.
	Pulsing has been paused either manually, by an interrupt signal or through Modbus	If the timer has been paused manually, it must be returned either to the Automatic or Pulsing Mode.
		If the timer has been paused by an interrupt signal, this signal must be deactivated.
		If the timer has been paused through Modbus, a command to restart pulsing must be issued through Modbus.
	A disable pulsing type alarm has been triggered	Power down the dust collection plant and resolve the issue that has triggered the alarm before restarting the plant.
	Timer is in Automatic Mode (differential pressure control) and the differential pressure is below the high set point	Nothing needs to be done, the timer is functioning properly

Problem	Probable Cause	Remedy
Pulses are weak	Low voltage power supply to the timer	Check the voltage at which power is being supplied to the timer. A low voltage may be able to operate the LED display but will not be sufficient to operate the valves correctly.
	Tubing between the solenoid and diaphragm valves is kinked or has come undone	Check the connection of the pneumatic tubing between the solenoid and diaphragm valves. If the tubing has come undone, securely fit both ends to the fittings on the valves. If the tubing is kinked, replace tubing.
	Compressed air is being delivered to the diaphragm valves at lower pressure than what is recommended	Verify compressor rating and that it is working. Check supply lines for leaks.
Pulses are erratic	Two or more valves are being pulsed from a single card	Timer has not been correctly configured. Contact Donaldson Technical Services.
	Electrical or mechanical fault in valves	Confirm that solenoids have been wired correctly. Verify that diaphragms are working correctly. Contact Donaldson Technical Services for assistance.

11 APPENDIX - MODBUS ADDRESS TABLE

Modbus Address	Description	Output Interpretation	Read/Write Configuration	
			Basic Timer	ODCTC Timer
10001	Has the timer been placed on Halt mode through the keypad?	1 = Not interrupted 2 = Interrupted from keypad (placed in Halt Mode using timer push buttons) 3 = Interrupt/Critical Alarm recorded on Input Terminals	Read Only	Read Only
10002	Has the timer been paused through Modbus?	1 = Not paused through Modbus 2 = Paused through Modbus	NA (constant 1 output)	Read/Write
10003	Current differential pressure	0-255, in steps of 1mmWG	NA (constant NA output)	Read Only
10004	Current differential pressure control state	1 = below ultra-low setpoint 2 = below low setpoint 3 = between low and high setpoints 3 = between high and high-high setpoints 4 = between high-high and alarm setpoints 5 = above alarm setpoint	NA (constant NA output)	Read Only
10005	System Health Alarm Status	1 = Alarm not triggered 2 = Alarm active, not acknowledged 3 = Alarm active, has been acknowledged	Read Only	Read Only
10006	General Warnings Status	1 = Warnings not triggered 2 = Warnings active, not acknowledged by push buttons 3 = Warnings active, has been acknowledged on push buttons	Read Only	Read Only
10007	Total number of valves controlled by timer	1-60	Read Only	Read Only
10008	Total number of valves having electrical faults	0-60	Read Only	Read Only

Modbus Address	Description	Output Interpretation	Read/Write Configuration	
			Basic Timer	ODCTC Timer
10009	Total number of leaking filters in plant (assumes one filter per valve, available when particulate sensor/broken bag detector is connected)	0-60	Read Only	Read Only
10010	Total number of valves having mechanical faults (available when manifold pressure sensor is connected)	0-60	Read Only	Read Only
10011	Control Mode (auto/manual on ODCTC version)	1 = Time interval based 2 = Differential pressure based 3 = Down time/Offline cleaning (this value cannot be written)	Read Only	Read/Write
10012	Next valve number to be pulsed	1-60	Read Only	Read Only
10013	Time to the next pulse	0-255, in steps of 1 sec (output is capped at 255 if greater)	Read Only	Read Only
10014	Pulse duration	0-255, in steps of 1ms (output is capped at 255 if greater)	Read Only	Read/Write
10015	Interval between pulses in normal mode	0-255, in steps of 1 sec (output is capped at 255 if greater)	Read Only	Read/Write
10016	Interval between pulses in fast mode	0-255, in steps of 1 sec (output is capped at 255 if greater)	NA (constant NA output)	Read/Write
10017	Current ultra low dP set point	0-255, in steps of 1mmWG	NA (constant NA output)	Read/Write
10018	Current low dP set point	0-255, in steps of 1mmWG	NA (constant NA output)	Read/Write
10019	Current high dP set point	0-255, in steps of 1mmWG	NA (constant NA output)	Read/Write
10020	Current high-high dP set point	0-255, in steps of 1mmWG	NA (constant NA output)	Read/Write
10021	Current alarm dP set point	0-255, in steps of 1mmWG	NA (constant NA output)	Read/Write
10022	Is offline cleaning activated in software?	1 = Not set up 2 = Yes	Read Only	Read/Write

Modbus Address	Description	Output Interpretation	Read/Write Configuration	
			Basic Timer	ODCTC Timer
10023	Number of offline cleaning cycles	0-255	Read Only	Read/Write
10024	Offline cleaning status	1 = contact closed	Read Only	Read Only
		2 = contact open but offline cleaning disabled in settings		
		3 = contact open and offline cleaning running		
		4 = contact open; offline cleaning completed		
10025	Is Auto-Pulse set up?	1 = no	Read Only	Read/Write
		2 = yes		
10026	Duration between Auto-Pulse activation	0-24, in steps of 1 hour	Read Only	Read/Write
10027	Input 1 type	1 = not used	NA (constant NA output)	Read Only
		2 = PlusDP sensor		
10028	Input 1 current value	0-255, in steps of 1mmWG if set as PlusDP sensor. 0 if not used	NA (constant NA output)	Read Only
10029	Input 2 type	1 = not used	Read Only	Read Only
		2 = digital interrupt		
		3 = general alarm (digital)		
		4 = general alarm (analog)		
		5 = critical alarm (digital)		
		6 = critical alarm (analog)		
10030	Input 2 current value	0-100 in percentage of range if configured as analog input; 0 or 1 of configured as digital; 0 if not used.	Read Only	Read Only
10031	Input 2 activation threshold	0-100 in percentage of range if configured as analog input; 0 or 1 of configured as digital; 0 if not used.	Read Only	Read/Write
10032	Input 2 current status	1 = has not been triggered	Read Only	Read Only
		2 = triggered but not acknowledged		
		3 = triggered and acknowledged		

Modbus Address	Description	Output Interpretation	Read/Write Configuration	
			Basic Timer	ODCTC Timer
10033	Input 3 type	1 = not used 2 = digital interrupt 3 = general alarm (digital) 4 = general alarm (analog) 5 = critical alarm (digital) 6 = critical alarm (analog) 7 = LeakPlus probe (general configuration) 8 = LeakPlus probe (critical configuration)	Read Only	Read Only
10034	Input 3 current value	0-100 in percentage of range if configured as analog input; 0 or 1 of configured as digital; 0 if not used.	Read Only	Read Only
10035	Input 3 activation threshold	0-100 in percentage of range if configured as analog input; 0 or 1 of configured as digital; 0 if not used.	Read Only	Read/Write
10036	Input 3 current status	1 = has not been triggered 2 = triggered but not acknowledged 3 = triggered and acknowledged	Read Only	Read Only
10037	Input 4 type	1 = not used 2 = Diaphragm Mechanical Failure (manifold pressure) sensor	NA (constant NA output)	Read Only
10038	Input 4 current value	0-100, in percentage of sensor range if configured as Diaphragm Mechanical Failure sensor; 0 if not used.	NA (constant NA output)	Read Only
10039	Interval between tube cleaner activation	0-24, in steps of 1 hour	NA (constant NA output)	Read/Write
10040	Duration of tube cleaner activation	0-100, in steps of 1 sec	NA (constant NA output)	Read/Write
10041	Number of pulses generated since last service	0-255, as percentage of counter threshold. High threshold rated at 100% with top ceiling at 255%	Read Only	Read Only
10042	Number of hours system has been operated since last service	0-255, as percentage of counter threshold. High threshold rated at 100% with top ceiling at 255%	Read Only	Read Only

Additional 6 registers/Modbus addresses are available for monitoring information specifically requested by customers. Contact Donaldson Technical Services with requests for customising these registers.

GLOSSARY OF TERMS

Standard pulsing algorithm – when valve number 2 is pulsed immediately after valve number 1 and so on.

Arbitrary pulsing algorithm – in this case the valves or set of valves can be pulsed in any order, eg. valve number 5 is pulsed immediately after valve number 3 and so on.

Category 5 (CAT5) cable – a twisted pair cable for carrying low voltage communication signals. A day to day example of CAT5 cables would be the blue LAN (ethernet) cables for computers.

Cumulative valve failure – situation where multiple valves on the collector cleaning system have failed and the system can no longer satisfactorily clean the filter media. On a Donaldson dust collector cumulative valve failure alarms are activated when more than 30% of the valves on the collector have failed.

Dual inline package (DIP) switch – a mechanical electric switch that is packaged with others in a group for use primarily on a printed circuit board along with other electronic components.

Firmware – program code stored in the on board memory of the STi timer to control how the timer functions.

Offline cleaning – cleaning mode in which filters are cleaned when the dust collector fan has been turned off. In this mode, a preset number of cleaning cycles are activated to ensure that dust particles are dislodged from the filter media.

On demand cleaning – cleaning mode in which filters are cleaned only when they are dirty, thereby reducing the compressed air consumption and increasing filter life.

Sequential pulsing mode – when one valve is pulsed at a time.

Parallel pulsing mode – when a set of two or more valves are pulsed at a time.

The Donaldson Torit Warranty

Donaldson warrants to the original purchaser that the major structural components of the goods will be free from defects in materials and workmanship for ten (10) years from the date of shipment, if properly installed, maintained and operated under normal conditions. Donaldson warrants all other Donaldson built components and accessories including Donaldson Airlocks, TBI Fans, TRB Fans, Fume Collector products, Donaldson built electrical control components and Donaldson built After filter housings for twelve (12) months from date of shipment. Donaldson warrants Donaldson built filter elements to be free from defects in materials and workmanship for eighteen (18) months from date of shipment. Donaldson does not warrant against damages due to corrosion, abrasion, normal wear and tear, product modification, or product misapplication. Donaldson also makes no warranty whatsoever as to any goods manufactured or supplied by others including electric motors, fans and control components. After Donaldson has been given adequate opportunity to remedy any defects in material or workmanship, Donaldson retains the sole option to accept return of the goods, with freight paid by the purchaser, and to refund the purchase price for the goods after confirming the goods are returned undamaged and in usable condition. Such a refund will be in the full extent of Donaldson's liability. Donaldson shall not be liable for any other costs, expenses or damages whether direct, indirect, special, incidental, consequential or otherwise. The terms of this warranty may be modified only by a special warranty document signed by a Director, General Manager or Vice President of Donaldson. Failure to use genuine Donaldson replacement parts may void this warranty. THERE EXIST NO OTHER REPRESENTATIONS, WARRANTIES OR GUARANTEES EXCEPT AS STATED IN THIS PARAGRAPH AND ALL OTHER WARRANTIES INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHETHER EXPRESS OR IMPLIED ARE HEREBY EXPRESSLY EXCLUDED AND DISCLAIMED.

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FILTRATION SOLUTIONS

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