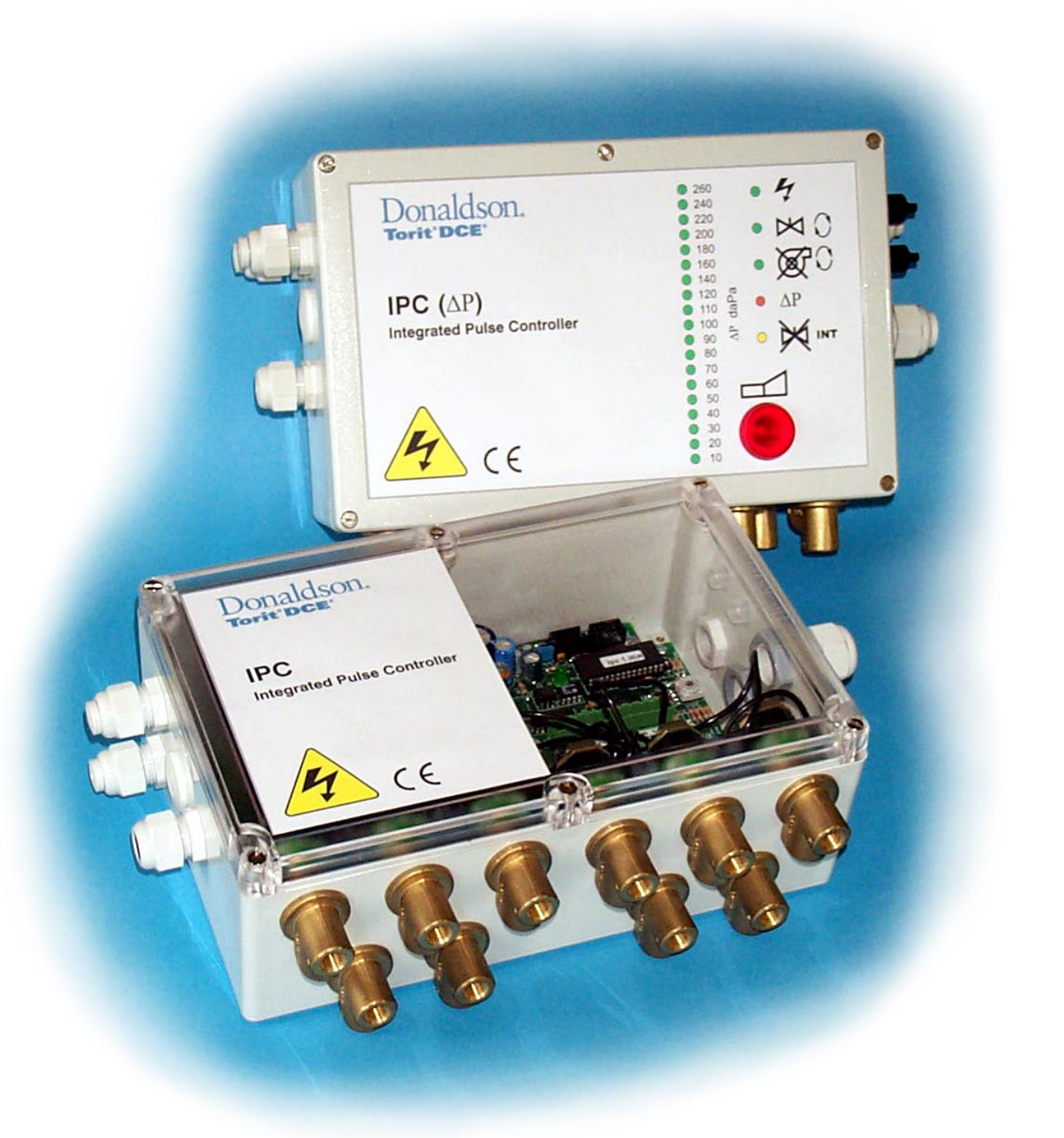
Installation, Operation and Maintenance Manual

Donaldson
Torit® DCE®

IPC and IPC (ΔP) Controllers

(from February 2007)



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Donaldson®

IMPORTANT

PLEASE READ THIS MANUAL CAREFULLY BEFORE INSTALLATION

THIS MANUAL SHOULD BE READ IN CONJUNCTION WITH THE RESPECTIVE PRODUCT MANUAL SUPPLIED WITH THE DUST COLLECTOR

FOR IPC CONTROLLERS WITH MOTOR STARTER OPTION, REFER ALSO TO SUPPLEMENTARY MANUAL ON STARTING EQUIPMENT AND CIRCUIT DRAWINGS

EXPLANATION OF SYMBOLS USED

Indicates information on the efficient operation of the collector.

Indicates important information directed towards preventing damage.

Indicates an important warning, designed to prevent injury or extensive damage.

CONTENTS

INSTALLATION

It is a requirement of the Supply of Machinery (Safety) Regulations 1992 to provide adequate isolation and emergency stop facilities. Due to the varied nature of site installations this cannot be provided by Donaldson but instead is the responsibility of the customer.

All electrical work should be carried out by competent personnel.

Always isolate power before opening the controller.

Special precautions/procedures are required for installation of IPC Controllers in hazardous areas (refer to page 6).

Each dust collector may be supplied with either an IPC or an IPC (ΔP) Controller, which is used to operate the reverse jet cleaning.

Dalamatic Insertable:

Attach the controller and make connections in accordance with the installation instructions in the dust collector product manual, Publication 1730.

Dalamatic Cased:

The controller is supplied fitted to the manifold assembly. For 'multi-bank' collectors, connect controller to the solenoid valve enclosures in accordance with the installation instructions in the dust collector product manual, Publication 1731. Refer also to 'Multi-bank Collectors – IPC Controller Parallel-linked system' in the 'Operation' section.

Modular Baghouse (MBT):

Attach the controller to the support structure of the dust collector using the brackets supplied. Connect the controller to the solenoid valve enclosures as described under 'Multi-bank Collectors – IPC Controller Parallel-linked system' in the 'Operation' section.

Sintamatic Insertable:

Open the plastic bag, supplied with the filter, containing fixing bolts, tubing and controller mounting brackets. Fix the brackets to the controller using 4 x M4 fixing bolts and nuts (see Fig. 1). Attach the controller to the preferred side of the filter body using 4 x M8 fixing bolts and nuts. Cut tubes to length and push-fit to the diaphragm valves under the compressed air manifold, in the order according to the installation instructions in the dust collector product manual, Publication 1726. Pass the tubes through the holes in the side of the filter body, and push-fit to the corresponding solenoid pilot valves projecting from the controller (valves are numbered in sequence from the left, see Fig. 2 for typical arrangement). Ensure each tube is firmly connected to the valve.

INSTALLATION

Unicell Unit:

On C10-30 hopper type collectors, C10-30 venting type collectors and C10-30 venting type collectors with dust container, the controller is supplied fully fitted to the base section.

On C40-90 collectors the controller is supplied fully fitted to the controls section.

On C10-30 standard collectors with dust container or rotary valve and C10-30 venting type collectors with rotary valve, the controller is supplied fitted to the base section. Connect the tubing in accordance with the installation instructions in the dust collector product manual, Publication 2711.

DCE 2000 Series:

The controller is supplied fully fitted to the controls section of the collector.

DCE HV500 Series:

The controller is supplied fully fitted below the compressed air manifold of the collector.

Siloair:

The controller is supplied fully fitted to the filter body, below the compressed air manifold.

Spotair:

When the Spotair filter is supplied with an optional IPC (ΔP) Controller, it is fully fitted to the top of the filter body, adjacent to the compressed air manifold.

DF4 and DF6, DFO, TDS, TDP, DFP:

The controller is supplied fitted to the collector. Connect the controller to the solenoid valve enclosure.

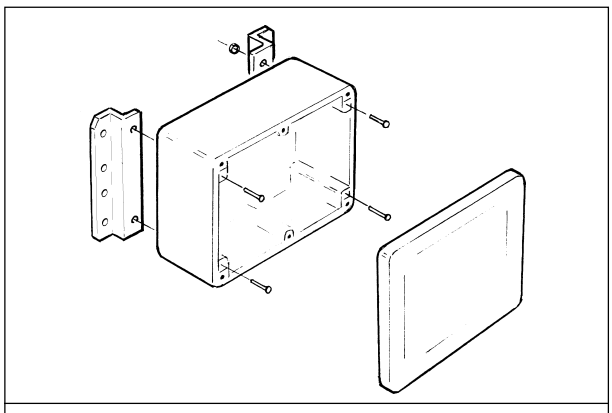


Figure 1 Fixing brackets to controller

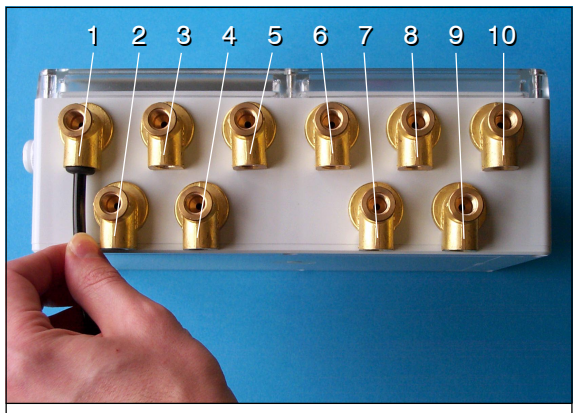


Figure 2 Typical connection to controller

INSTALLATION

Refer to Fig. 17 in 'Specification' section for typical wiring arrangements.

All terminal blocks are removable for ease of connection.

For installation in hazardous areas, all work must be carried out with the electrical supply isolated or only when the potentially explosive atmosphere is not present. Checks should be made to ensure the category of equipment is suitable for the zone in which the installation is made.

Overload protection

A fused isolator, fitted with either a 4A fuse for 24V supply or a 1A fuse for 110/240V supply, should be fitted between the controller and incoming supply. A high rupturing capacity (HRC) cartridge-type fuse must be used.

IPC Controller connections and set-up

Remove the lid of the controller by unscrewing the six retaining screws. Connect the incoming supply to the terminal block (see Fig. 3 and Table 1).

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

Ensure that the switch for the pulse duration and the interval between pulses (see Fig. 4) is set in accordance with Table 2.

Replace the controller lid using the six screws. Switch on the mains supply. The green power-on LED will flash, indicating normal operation and the cleaning sequence will commence.

Refer to dust collector product manual for start-up procedure of equipment.

TABLE 1 — INCOMING POWER SUPPLY

Power supply	Connection
220-240V AC	Terminals 1 and 3
110V AC	Terminals 2 and 3
24V DC	Terminals 5 and 6

The protective earth (PE), terminal 4, should be connected in all cases.
For IPC Controllers installed in potentially hazardous areas, the earth connection to the solenoid valve bodies must also be connected to terminal 4. For systems employing slave solenoid enclosures, the earth connection must be made to these solenoids also.

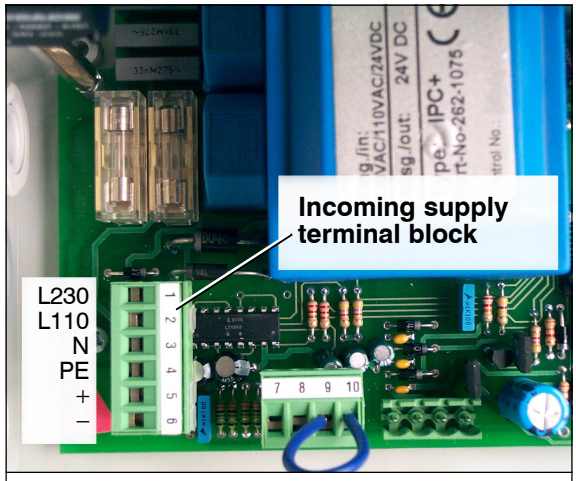


Figure 3 Incoming supply connection

INSTALLATION

IPC (ΔP) Controller connections and set-up

Remove the lid of the controller by unscrewing the six retaining screws. Remove retainer and lift up the hinged top PCB assembly. Connect the incoming supply to the terminal block (see Fig. 3 and Table 1).

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

Ensure that the switch, on the base PCB, for the pulse duration and the interval between pulses (see Fig. 4) is set to the 'F' position. (For controllers fitted with optional heater, set switch to '0' position).

In order to utilise the ΔP cleaning option of the IPC (ΔP) Controller, the cleanside (coloured blue and labelled P1) and dirtyside (labelled P2) tapping points on the controller (see Fig. 5), need to be fitted to the cleanside and dirtyside tappings on the casing of the collector using the tubing supplied.

For Dalamatic Insertable and Sintamatic Insertable filters, only the cleanside tapping point is located on the casing. The customer will need to make provision for fitment of the dirtyside tapping point to the equipment (typically on the silo or mounting flange).

Incorrect connections of the cleanside and dirtyside tapping points will be indicated by flashing LEDs on the ΔP scale of the controller when the collector is operating.

To avoid ingress of dust into the controller pressure transducer, it is recommended that a filter is fitted between the dirtyside of the collector and the controller connection. For collectors handling explosive dusts this filter must be used.

Close the hinged top PCB back into position and secure. Switch on the mains supply. The green power-on LED will illuminate.

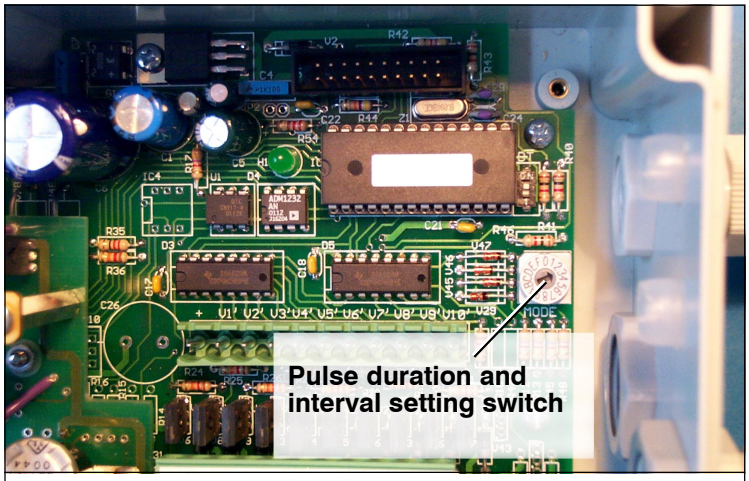


Figure 4 Pulse duration and interval setting

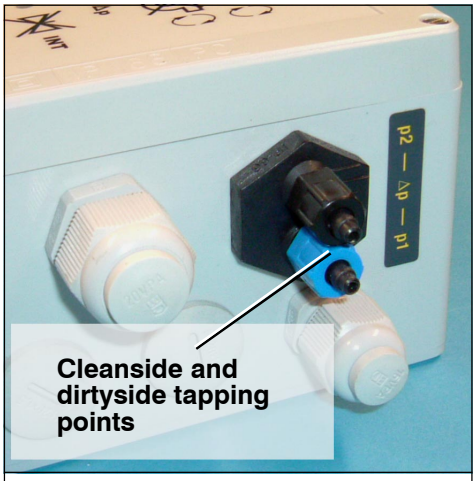


Figure 5 ΔP connections

INSTALLATION

To set up the IPC (ΔP) Controller use the select button to scroll through the set-up options available (a flashing LED will indicate the parameter being set). Use the + and – buttons to adjust the settings (see Fig. 6).

The options available are as follows:

ΔP Al High ΔP alarm set point. Single LED illuminates to indicate set point; + and – buttons cycle through 10-260 daPa scale. To turn alarm function off, press – button until function off ∅ is illuminated.

ΔP Max ΔP high limit set point (point at which cleaning will commence when ΔP cleaning is used). Single LED illuminates to indicate set point; + and – buttons cycle through daPa scale.

It is not possible to set the ΔP high limit below the ΔP low limit setting. When re-setting the ΔP high limit, the controller will, if necessary, automatically reduce the pre-set low limit to 1 point below the new high limit.

ΔP Min ΔP low limit set point (point at which cleaning will cease when ΔP cleaning is used). Single LED illuminates to indicate set point; + and – buttons cycle through daPa scale from 1 point below current ΔP high point to 10 daPa.

Continuous cleaning. To achieve continuous cleaning, set the ΔP high limit and ΔP low limit set points to off by pressing the – button until function off ∅ is illuminated. To reactivate ΔP cleaning both the ΔP high limit and ΔP low limit set points must be reset.

Off-line cleaning time. Single LED illuminates to indicate number of cycles (1-26); + and – buttons cycle through 10-260 daPa scale. To turn off-line cleaning function off, press – button until function off ∅ is illuminated.

Pulse duration. Ensure that the pulse duration is set in accordance with Table 2. Single LED illuminates to indicate pulse duration (60-260 ms); + and – buttons cycle through daPa scale (60-260 only). Pulse duration of less than 60 ms is not possible.

Pulse interval. Ensure that the interval between pulses is set in accordance with Table 2. Single LED illuminates to indicate pulse interval on small scale 5s to 30s; + and – buttons cycle through scale.

ΔP Min Al (Optional: 4-20mA versions only). Low ΔP alarm set point. Single LED illuminates to indicate set point; + and – buttons cycle through 10-240 daPa scale. To turn alarm function off, press – button until function off ∅ is illuminated.

Selection of the above parameters will only be enabled, provided that the switch on the base PCB (see Fig. 4) is set to the 'F' position. (For controllers fitted with optional heater, set switch to '0' position).

Once each setting has been entered, the new value will be stored by pressing the select button once more. To change one setting only, the select button can be used to scroll through to the appropriate option. After a period of 5 seconds without any buttons being pressed, any new settings will be stored and the controller will operate normally. The controller settings are retained in memory even if the power is switched off.

Replace the controller lid using the six screws.

Refer to dust collector product manual for start-up procedure of equipment.

INSTALLATION

Interrupt option

For a description of this option, refer to 'Operation' section. In order to utilise this function, a volt free contact should be connected across terminals 7 and 8 on the base PCB (see Fig. 7). Closing the contact stops the cleaning cycle, opening the contact restarts the cycle. When the interrupt signal is received, the green power-on LED will illuminate continuously on the IPC Controller, or, on the IPC (ΔP) Controller, the ' INT ' LED will illuminate on the front panel.

Off-line cleaning facility

For a description of this facility, refer to 'Operation' section.

IPC controller

In order for this function to operate, remove the bridging link between terminals 9 and 10 on the base PCB (see Fig. 7) and connect a normally open contact on the fan starter across terminals 9 and 10. Set the off-line cleaning switch on the base PCB to the 'on' position (see Fig. 8). The power to the controller must be permanently connected. When the fan starts and contacts 9 and 10 are closed, the controller will operate normally. When the fan stops and the contacts are opened, the controller will continue to pulse for 7 complete cycles and then stop. Off-line cleaning can be switched on or off as desired, by setting the switch to the appropriate position.

The interrupt function will override the off-line cleaning function.

IPC (ΔP) Controller

Off-line cleaning on the IPC (ΔP) Controller can be activated with a hard-wired connection as described above. However, the controller will off-line clean automatically, based on the pressure drop reading. Therefore, connections to terminals 9 and 10 are not required and the bridging link should be left in place. Power must be permanently connected to the controller (i.e. not switched off with the fan). The controller will operate normally (continuous or in ΔP mode as selected) as long as the pressure drop is above 10 daPa. If off-line

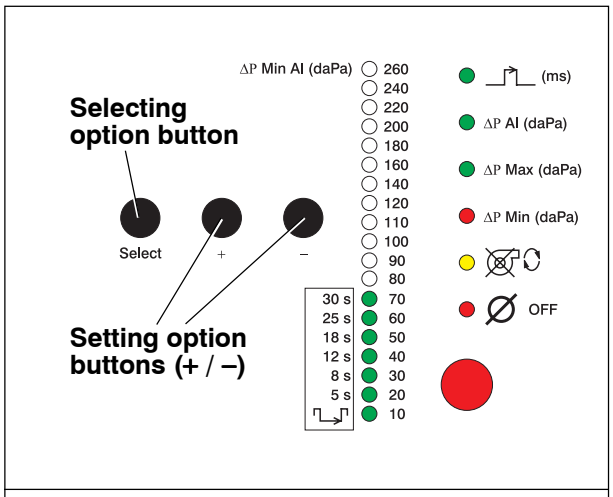


Figure 6 ΔP set-up buttons

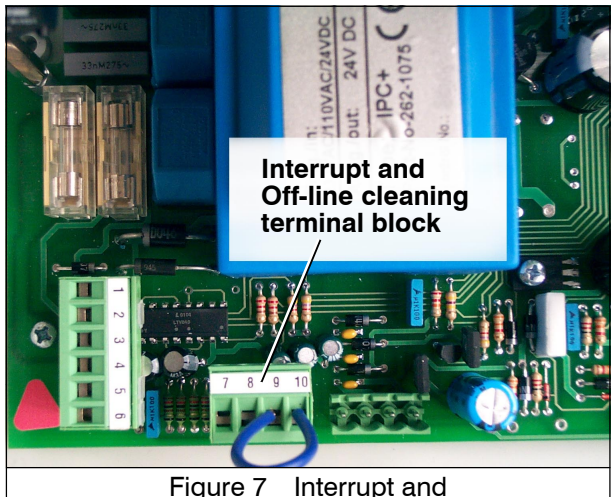


Figure 7 Interrupt and Off-line cleaning connection

INSTALLATION

cleaning is selected during set-up and the pressure drop falls below 10 daPa (i.e. the fan is stopped) the controller will switch to off-line clean mode and the valves will fire for a complete number of cycles stored in memory. When the pressure drop rises above 10 daPa (either during or after the off-line cleaning period) the controller will return to its normal operating mode.

The interrupt function will override the off-line cleaning function.

Alarm relay – IPC (ΔP) Controller only

For a description of this function, refer to 'Operation' section. Connection to the relay contact is made using terminals 15, 16 and 17 (15 and 16 normally open; 15 and 17 normally closed) on the underside of the top PCB (see Fig. 9).

This relay is energised in the non alarm state.

In use relay – IPC (ΔP) Controller only

For a description of this function, refer to 'Operation' section. Connection to the relay contact is made using terminals 18, 19 and 20 (18 and 19 normally open; 18 and 20 normally closed) on the underside of the top PCB (see Fig. 9).

4-20mA output – IPC (ΔP) Controller only (optional)

For a description of this function, refer to 'Operation' section. Output connection is made using terminals 23 (+) and 24 (–) on the underside of the top PCB (see Fig. 9).

Minimum Pressure Alarm – IPC (ΔP) Controller only (optional)

For a description of this function, refer to 'Operation' section. Connection to the relay contact is made using terminals 21 and 22 (normally open contact – contact will close when ΔP is above alarm set point) on the underside of the top PCB (see Fig. 9).

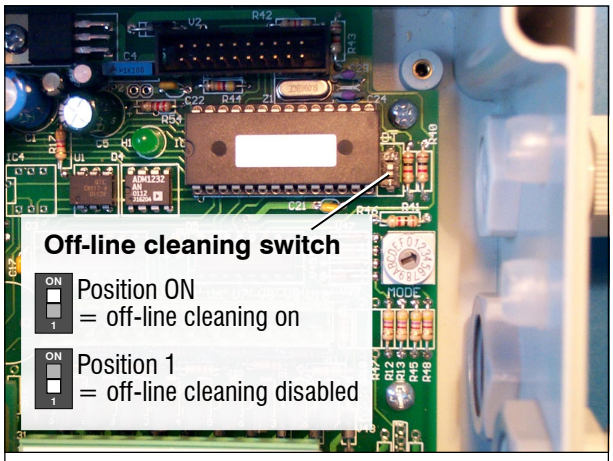


Figure 8 Off-line cleaning switch

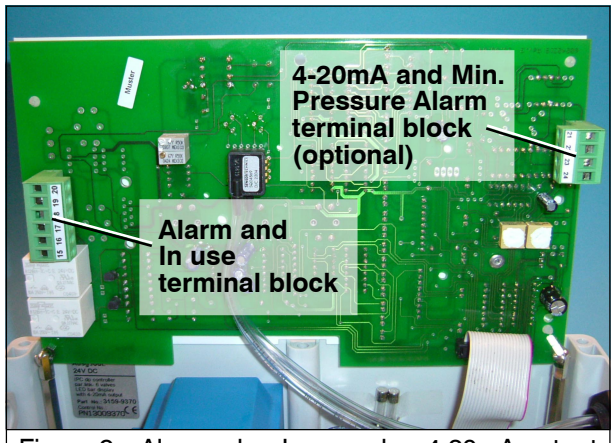


Figure 9 Alarm relay, In use relay, 4-20mA output and Minimum Pressure Alarm relay connection

TABLE 2 — CONTROLLER INSTALLATION SETTINGS

Dust collector type	IPC CONTROLLER	IPC (ΔP) CONTROLLER		
	Pulse duration and interval switch setting	Base PCB switch setting	Pulse duration	Interval
Dalamatic Insertable				
Models: V3/7, V4/7, V5/12, V6/10, V7/7, V7.5/12, V8/7, V9/15, V10/10, V12/10, V13/12, V14/7, V15/12, V15/15, V18/15 and V20/10 (5-valve version)	8	F*	200 ms	25 sec.
Models: V20/10 (10-valve version), V21/7, V25/12, V30/10, V30/15, V38/12, V45/15, V50/12 and V60/15	3	F*	60 ms	12 sec.
Dalamatic Cased (series DLM 15)				
2- to 5-tier models	3	F*	60 ms	12 sec.
6- to 8-tier models	4	F*	100 ms	12 sec.
Modular Baghouse (series MBT)				
All models	4	F*	100 ms	12 sec.
Sintamatic Insertable				
All models	3	Not applicable	Not applicable	Not applicable
Unicell Unit				
All models	4	F*	100 ms	12 sec.
DCE 2000 Series				
Models: F2012 and F2018	6	F*	60 ms	18 sec.
Models: F2024, F2030, F2036 and F2045	3	F*	60 ms	12 sec.
Models: S2021, S2026, S2031, S2040, S2053, S2066, S2080 and S2100	3	Not applicable	Not applicable	Not applicable
DCE HV500 Series				
Models: F504, F506, F508, F510, F514 and F520	8	F*	200 ms	25 sec.
Models: F530, F538 and F545	3	F*	60 ms	12 sec.
Models: C508, C510, C516, C520, C524, C530, C540 and C548	4	F*	100 ms	12 sec.
Siloair				
All models	4	F*	100 ms	12 sec.
Spotair				
All models	Not applicable	F*	200 ms	25 sec.
All of the following products:				
DF4 and DF6, DFO, TDS, TDP, DFP	4	F*	100 ms	12 sec.**

These figures apply to collectors built from February 2007. For collectors built prior to this date refer to product manual.

* For controllers fitted with optional heater, set switch to '0' position.

** The pulse interval should be set at 25 sec. for products supplied with a serial-linked control system.

For a complete listing of available pulse intervals/durations see Appendix A.

OPERATION

The controller is fully automatic and ensures that the diaphragm valves of the dust collector it serves are operated in sequence, at regular intervals, to facilitate the efficient cleaning of the filter elements. The pulse duration and the interval between pulses must be set according to the specific dust collector model (see Table 2). These figures should not be altered without prior consultation with Donaldson.

Interrupt option

The controller offers the facility to interrupt and restart the cleaning cycle at any point. This is particularly useful on venting applications where the actual filter operates over a short period of time (e.g. pneumatic conveying of small quantities of product) where a complete cleaning cycle may not take place. Under normal circumstances if the power to the controller is switched off the cleaning cycle is reset to the first element position when the power is reapplied. The interrupt option can be used to start and stop the cleaning without the controller resetting, provided that the power is left on, ensuring that all filter elements are cleaned. When the interrupt signal has stopped the cleaning cycle, the green power-on LED will illuminate continuously on the IPC Controller, or, on the IPC (ΔP) Controller, the ' INT ' LED on the front panel will illuminate.

Off-line cleaning facility

This function (when enabled) allows the cleaning cycle to continue for a period of time after the fan has been switched off. For the IPC Controller, the off-line cleaning will operate for 7 complete cycles. For the IPC (ΔP) Controller, the off-line cleaning will operate according to the parameters entered by the buttons on the top PCB (refer to 'Installation' section). On the IPC (ΔP) Controller, the ' ' LED on the front panel will illuminate when the controller is operating in off-line cleaning mode.

ΔP control – IPC (ΔP) Controller only

The principle feature of the IPC (ΔP) Controller is the ΔP control system, which ensures effective and economical use of the dust collector's reverse-jet cleaning system. Under normal operation a dust coating on the filtration medium can enhance the filter's overall efficiency but this 'dust cake' will become detrimental if allowed to build up to such an extent that it becomes a barrier to the air flow.

The ΔP control system monitors this build-up of dust by measuring the Differential Pressure (known as the 'ΔP') across the filtration medium and dust cake. The IPC (ΔP) Controller will activate the cleaning system when an adjustable preset high level limit is reached and maintain cleaning until the differential pressure has returned to a second adjustable preset low limit, when the cleaning system will be switched off (refer to 'Installation' section). This process is repeated every time the pressure rises to the high level limit.

This system ensures that a combination of both efficient filter performance and minimum compressed air consumption is maintained.

OPERATION

Alarm relay – IPC (ΔP) Controller only

The alarm relay provides a volt free changeover contact to indicate an alarm condition. The alarm condition is either a power fail or high filter pressure drop. The pressure drop level at which the alarm is triggered is entered by the buttons on the top PCB (refer to 'Installation' section). When the alarm is active due to high filter pressure drop the large red alarm light and the ' ΔP ' LED, on the front panel, will illuminate.

This relay is energised in the non alarm state.

In use relay – IPC (ΔP) Controller only

This provides a volt free changeover contact which indicates whether the cleaning system is active or inactive. This can typically, be used to provide information to a PLC/Scada system. When the cleaning system is active the ' ⋈ ◯ ' LED, on the front panel, will illuminate.

4-20mA output – IPC (ΔP) Controller only (optional)

This output provides a 4-20mA output signal proportional to the measured pressure drop (0-260 daPa). This can be used to provide information to a PCL/Scada system or enable remote display of the dust collector operating pressure drop. The external resistance of the connected circuit should be in the range 150-250Ω. (The output is protected against short-circuit).

When a 24V DC input supply is used the 4-20mA signal is not potential free. The 4-20mA signal will be switched off when the controller is in off-line cleaning mode.

Applying an external voltage to the 4-20mA output may damage the controller.

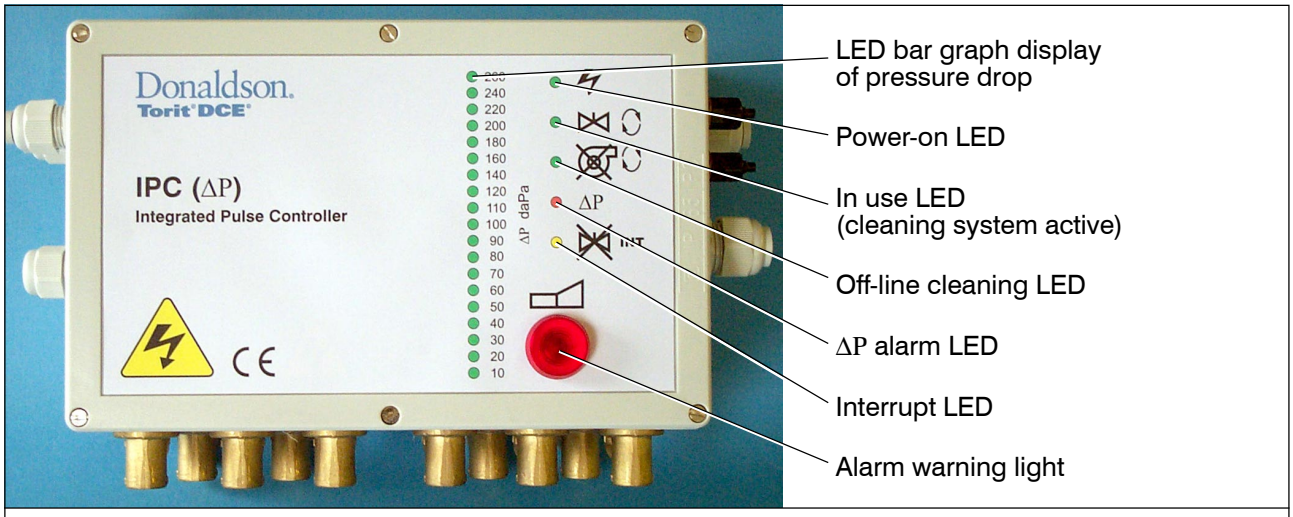


Figure 10 IPC (ΔP) Controller front panel

OPERATION

Minimum Pressure Alarm – IPC (ΔP) Controller only (optional)

The alarm relay provides a volt-free contact to indicate an alarm condition. The alarm condition is a low filter pressure drop or power supply failure. The pressure drop level at which the alarm is triggered is entered by the buttons on the top PCB (refer to 'Installation' section). When the alarm is active due to low pressure drop, the relay contacts will open.

This alarm will not illuminate the large red alarm light.

This relay is energised in the non alarm state.

Multi-bank collectors – IPC parallel-linked system

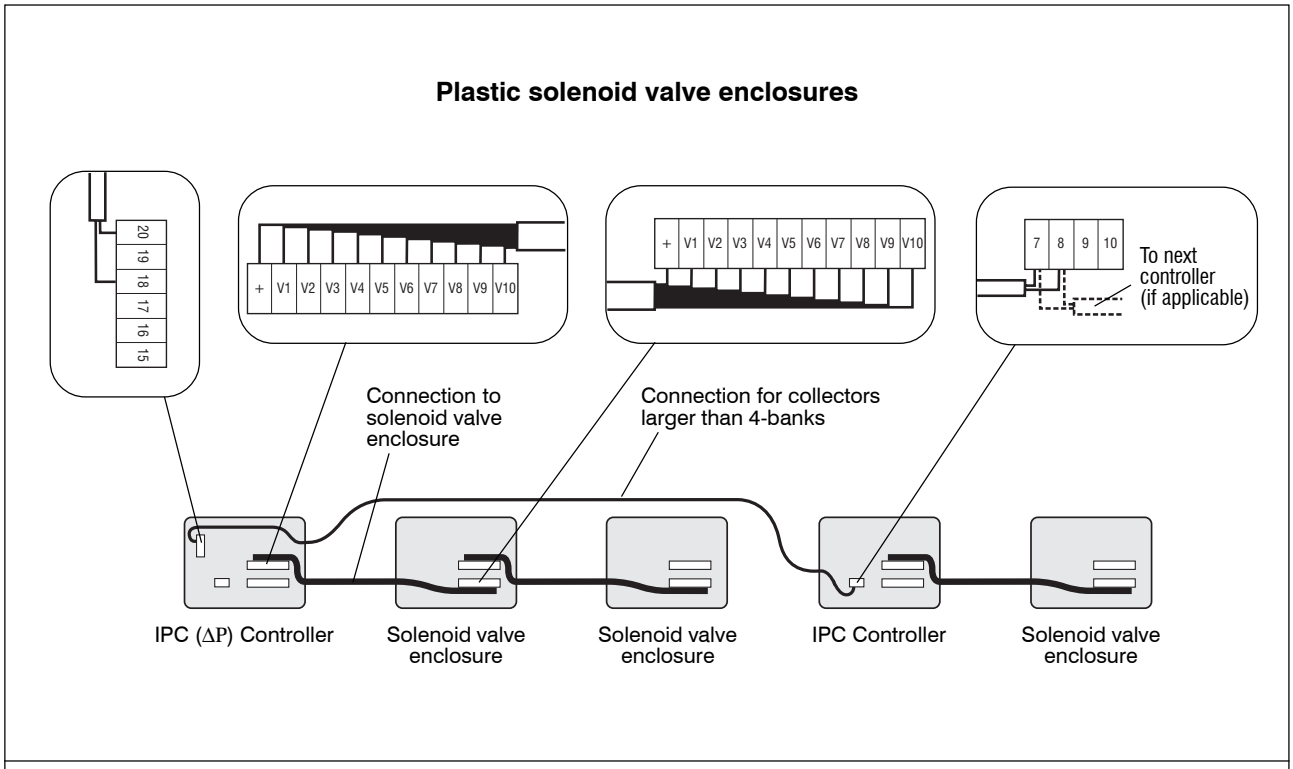
(Standard supply for DLM Cased, MBT and DFO 2-16 to DFO 4-96 collectors)

Where controllers are supplied separately for multi-bank collectors which use a number of separate solenoid valve enclosures, connections should be made as shown in Figure 11 and Table 3, using the cables supplied. One IPC Controller can operate up to 88W per output. Refer to dust collector product manual for controls assembly sequence.

TABLE 3 — TERMINAL/CABLE IDENTIFICATION

Terminal number / Valve number	Cable colour	Cable number
1	Red	1
2	Yellow	2
3	Blue	3
4	Green	4
5	Grey	5
6	Pink	6
7	Brown	7
8	Purple	8
9	White	9
10	Orange	10
11	–	11
12	–	12
+ common	Black	Highest number

OPERATION



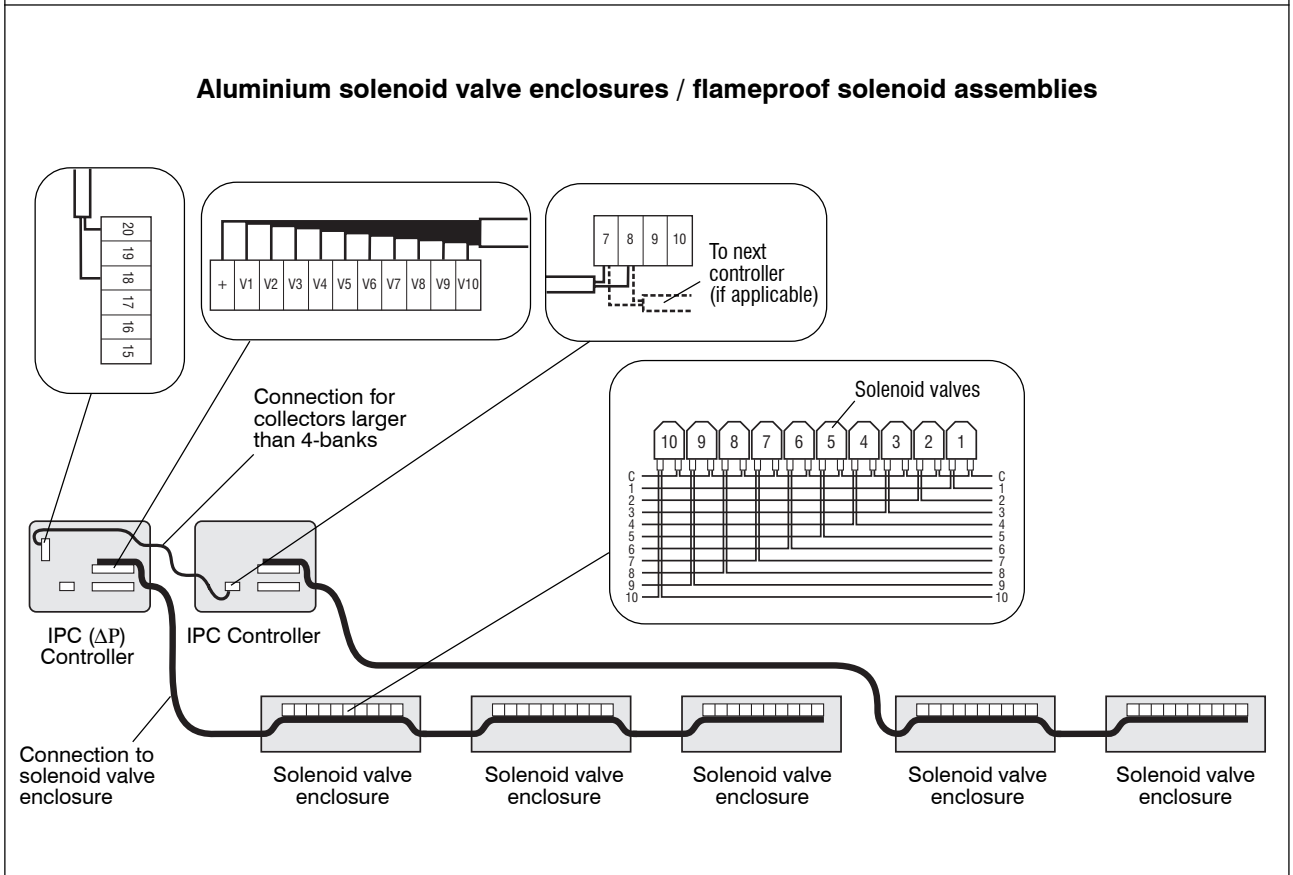


Figure 11 IPC parallel-linked multi-bank connection details (5-bank shown)

OPERATION

Multi-bank collectors – IPC serial-linked system

(Standard supply for DFO 4-104 to DFO 4-128 collectors)

The IPC serial-linked control system allows the IPC (ΔP) Controller to operate up to 96 valves in modules of 8, 10 or 12. This is achieved using a single master controller and up to 8 slave control modules.

The IPC serial-linked master controller has all the features of the standard IPC (ΔP) Controller and the individual pulse and ΔP control parameters should be set up as described in the 'Installation' section.

The system uses a 4-wire serial data link between master controller and slave modules, which carries both power and pulse signals (see Fig. 12).

The valves in a serial-linked control system will fire sequentially as shown in Figure 13.

The interval between individual pulses will be the overall interval, as set up on the master controller, divided by the number of slave modules (see Fig. 13). The number of slave modules is detected automatically by the master controller. The master controller will also detect the number of valves fitted to the slave modules and will set the cycle according to the module with most valves connected, e.g. for a combination of 8 and 12 valve modules, all modules will act as for a 12 valve module, resulting in a gap in the pulsing on the module with 8 valves (see Table 4). The cycle will therefore always be completed in the overall interval time, multiplied by the maximum number of valves per module.

Serial-linked slave modules will operate in order of connection to the master controller, closest first. Pulse parameters (i.e. interval and duration), will be as set in the master controller.

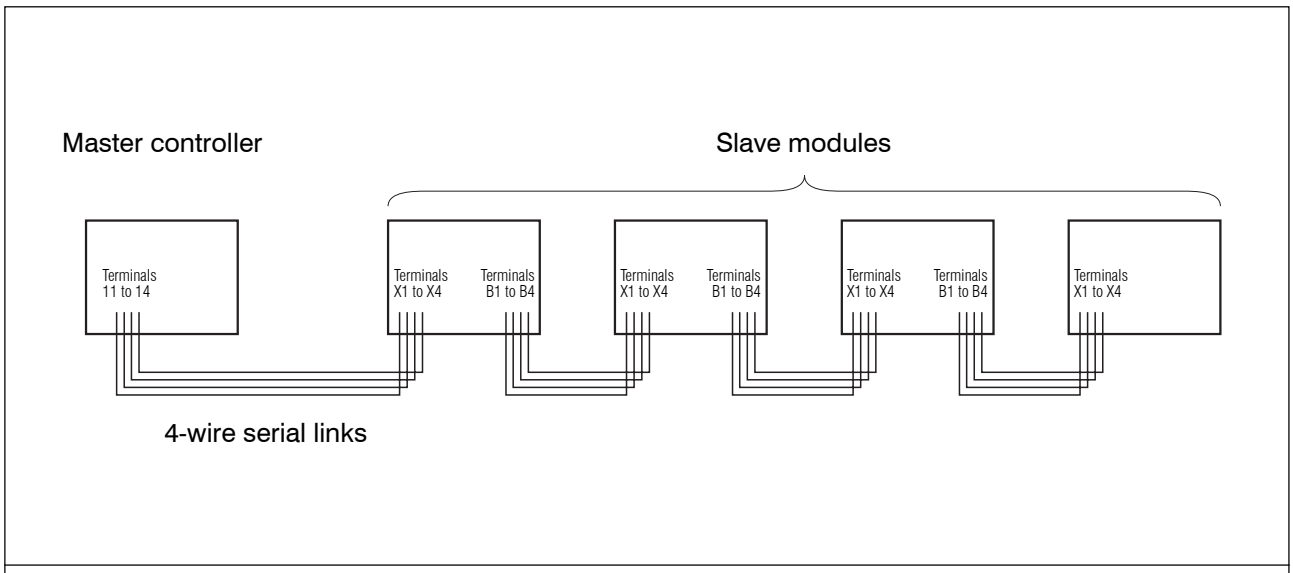
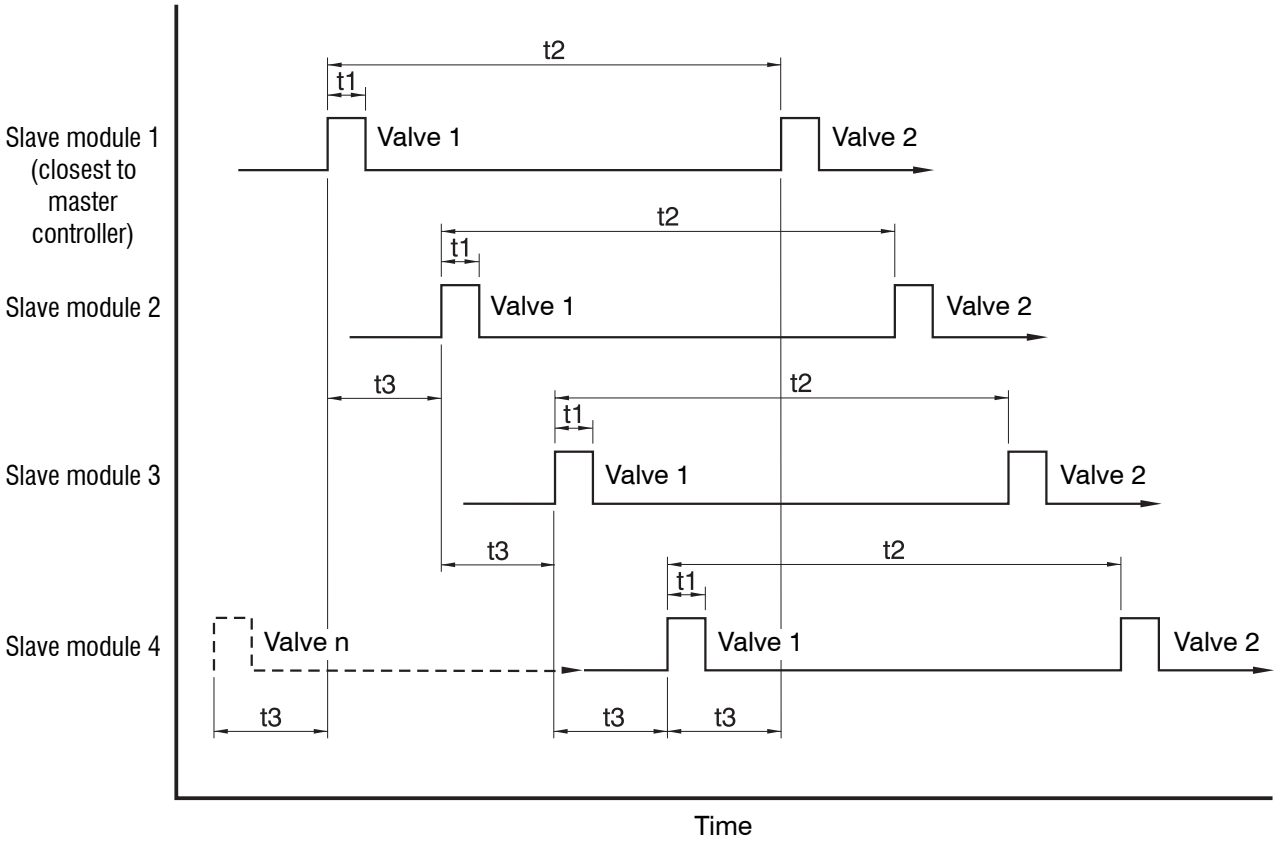


Figure 12 IPC serial-linked control system arrangement

OPERATION



t1 = Pulse duration (as set in master controller)
t2 = Pulse interval (as set in master controller)
t3 = t2 ÷ Number of slave modules fitted

4 slave module system shown.
Arrangements possible up to 8 slave modules in total, with 8, 10 or 12 valves per module.

Figure 13 IPC serial-linked control system operating sequence

MAINTENANCE

Always isolate power before opening the controller.

For controllers installed in potentially hazardous areas, suitable precautions should be taken to ensure no ignition sources are introduced or that the atmosphere is not hazardous during any maintenance operations or when making adjustments to operating parameters when the controller is energised.

Overload protection

A fused isolator, fitted with either a 4A fuse for 24V supply or a 1A fuse for 110/240V supply, should be fitted between the controller and incoming supply. A high rupturing capacity (HRC) cartridge-type fuse must be used.

Protection of the controller against an output current overload is achieved by 2 small HRC cartridge fuses mounted on the PCB (see Fig. 14). These fuses are 0.4A for 110/240V supply and 2.5A for 24V supply. In an emergency a quick-acting fuse could be used as a temporary alternative but a time delay fuse must not be used under any circumstances.

Two spare fuses are supplied inside the controller.

Replacement PCBs

Isolate supply to controller and, where applicable, ensure connections to Alarm and In use relays are also isolated.

All terminal blocks are removable for ease of connection.

The fitment of replacement PCBs is relatively simple. However, when fitting a new base PCB, the controller will automatically detect the number of solenoid valves connected, so it is necessary that the solenoid valves are connected in the same order as on the PCB being replaced.

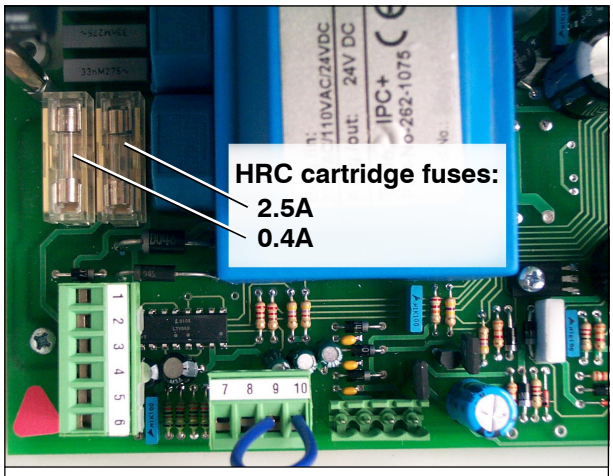


Figure 14 HRC cartridge fuse location

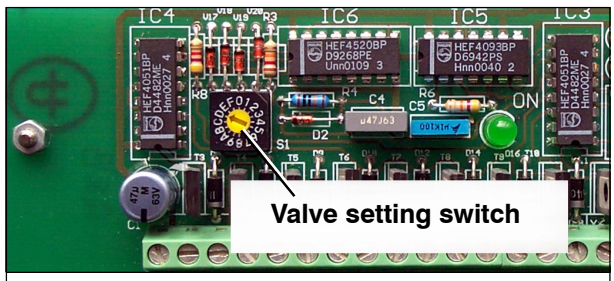


Figure 15 Slave module switch setting

MAINTENANCE

TABLE 4 — SWITCH SETTING FOR SLAVE MODULE PCBS

Maximum number of valves per module	Switch position
8	9
10	B
12	D

In a serial-linked system which has a combination of slave modules containing different numbers of valves, the switches for all slave modules should be set to the position corresponding to the module with the most valves connected. i.e. in a system with a combination of 8 and 12 valve modules, set all switches to position D (12 valves).

When replacing a new ΔP PCB the switch on the upper PCB (when fitted) should be set as indicated on the circuit board.

i.e. Software versions 1.45 and below – Switch S1 Position ON, Switch S2 Position 1.
Software versions 1.57 and above – Switch S1 Position 1, Switch S2 Position ON.
(Software version is labelled on the processor of the lower PCB).

Additionally, if replacing a PCB from a serial-linked slave module, ensure that the input connections (and, where applicable, the outlet connections) are made to the same terminals as the PCB being replaced. Also, ensure that the valve switch (see Fig. 15) is set in accordance with Table 4.

Failure to carry out these procedures will result in poor filter performance.

IPC (ΔP) Controller upgrade

A standard IPC Controller can be upgraded to an IPC (ΔP) Controller, on-site, relatively easily. In order to perform an upgrade, an IPC (ΔP) Controller upgrade kit is available.

The IPC (ΔP) Controller is not suitable for use with Sintamatic Insertable dust collectors. (Collectors with sintered elements must be cleaned continuously).

The upgrade kit contains the following:

- Top PCB assembly (with 4-20mA output)
- Two rear pillar and hinge assemblies
- Front support pillar
- Two lengths of 4 mm o/d tubing
- Dual tubing connector and nut
- Cleanside/dirtyside label
- Lid with bar graph display

External fitting kit is supplied to suit.

MAINTENANCE

To perform the upgrade the following procedure should be used (refer also to Fig. 16):

Isolate supply to controller.

1 Fit the two rear pillar and hinge assemblies into the corner bosses at the rear of the enclosure base.

2 Fit the front support pillar into the central boss, between the solenoid valves on the enclosure base.

3 Fit the top PCB assembly to the two rear hinged pillars.

4 Connect the top PCB to the base PCB using the ribbon cable.

5 Set the switch on the new ΔP PCB as indicated on the circuit board.
i.e. Software versions 1.45 and below – Switch S1 Position ON, Switch S2 Position 1.
Software versions 1.57 and above – Switch S1 Position 1, Switch S2 Position ON.
(Software version is labelled on the processor of the lower PCB).

6 Fit the dual tubing connector through the side of the controller box, using the nut.

7 Fit cleanside and dirtyside label to outside of the box, so that P1 and P2 correspond to the cleanside and dirtyside connectors respectively (see Fig. 5).

8 Connect the pressure transducer on the underside of the top PCB to the dual tubing connector, using the tubing. (The dirtyside connection on the pressure transducer is the one nearest to the PCB).

9 Connect cleanside and dirtyside tappings on the dust collector to the cleanside (coloured blue and labelled P1) and dirtyside (labelled P2) tappings on the controller, using the tubing.

10 Close hinged top PCB and secure to front pillar.

11 Switch on power.

12 Refer to 'Installation' section for set-up instructions.

Fault location

In the event of a controller failure, refer to Table 5 to identify the fault.

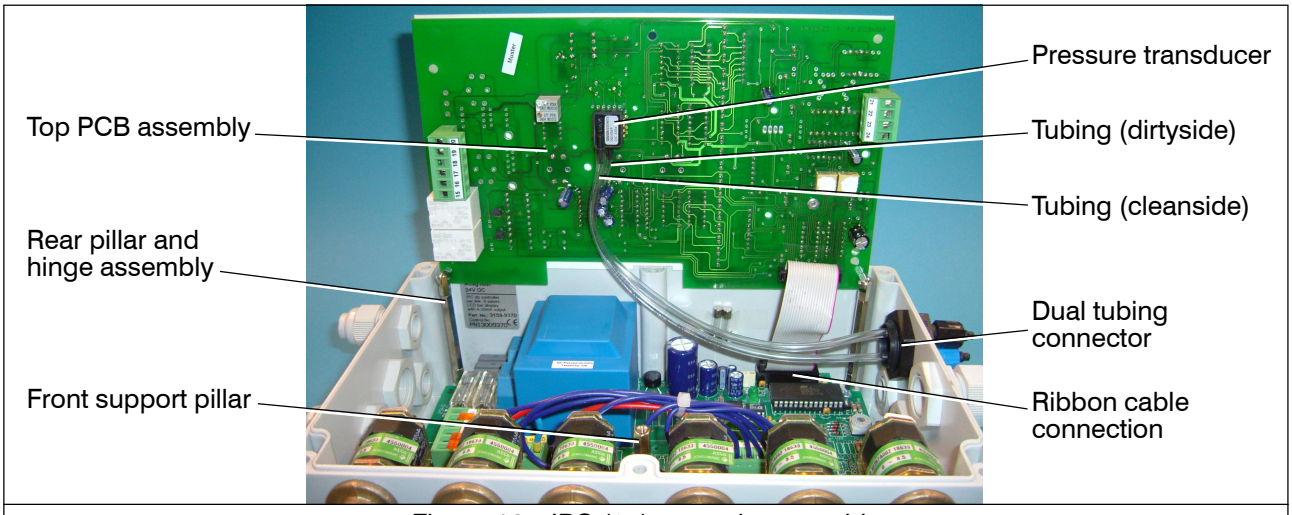


Figure 16 IPC (ΔP) upgrade assembly

TABLE 5 — FAULT LOCATION

	Symptom	Possible cause	Action
IPC and IPC (ΔP) Controllers			
A	Green power-on LED not illuminated.	• Electrical supply fault.	Check supply circuit for proper voltage. Check fuses, circuit breakers etc. Replace as required.
		• Incorrect wiring.	Check correct wiring connections to base PCB (refer to 'Installation' section).
		• Fuses have blown.	Check fuses. If fuses are blown check wiring connections. Replace fuses with correct type (refer to 'Maintenance' section).
		• Internal controller failure.	Replace PCB.
B	No cleaning pulses.	• Supply problem (green power-on LED not illuminated).	Refer to section A of Fault Location Table.
		• Yellow LED is illuminated.	Interrupt function is activated. Cleaning cycle will stop if terminals 7 and 8 are connected.
		• Off-line cleaning connection is not closed.	For normal cleaning operation, terminals 9 and 10 should be connected. If off-line cleaning is not being activated from external contact, these should be linked.
		• Low supply voltage.	Check supply voltage (a low voltage will not open valves but may operate LEDs normally).
		• Solenoid valves not connected correctly.	Check connections to solenoid valves in enclosure or external valve enclosures. Ensure connection plug is correctly engaged in PCB socket.
		• IPC (ΔP) Controller – pressure drop below high set point.	Refer to ΔP control in 'Operation' section.
C	No off-line cleaning.	• Supply problem (green power-on LED not illuminated).	Refer to section A of Fault Location Table.
		• Yellow LED is on.	Interrupt function is activated. Cleaning cycle (including off-line cleaning) will stop if terminals 7 and 8 are connected.
		• Terminals 9 and 10 connected.	Off-line cleaning activated by opening connection between terminals 9 and 10.
		• IPC Controller – off-line cleaning disabled.	Set switch to 'on' position (refer to 'Installation' section).
		• IPC (ΔP) Controller – off-line cleaning not activated.	Set up controller to off-line cleaning mode (refer to 'Installation' section).
		• IPC (ΔP) Controller – automatic off-line cleaning mode (airflow has not stopped).	Airflow is still present (off-line cleaning will not start until pressure drop has fallen below 10 daPa).
D	Incorrect/gaps in valve firing sequence.	• Solenoid valves not connected correctly.	Check connections to solenoid valves in enclosure or external valve enclosures. Ensure connection plug is correctly engaged in PCB socket.

TABLE 5 (CONTINUED) — FAULT LOCATION

	Symptom	Possible cause	Action
IPC (ΔP) Controller only			
F	No LEDs illuminate.	• Top PCB not connected properly.	Check ribbon cable connections between top and base PCB.
G	ΔP scale LEDs flash.	• ΔP connections reversed.	Change over cleanside and dirtyside connections.
H	Incorrect ΔP reading.	• Loose connections on ΔP pressure lines.	Check connections for leaks.
I	Alarm relay de-activates.	• Supply problem (green power-on LED not illuminated). • ΔP and Alarm warning light illuminated. • Dirtyside pressure connection broken/blocked/ leaking.	Refer to section A of Fault Location Table. High pressure drop (refer to ΔP control and Alarm relay in 'Operation' section). Check connections.
J	Incorrect 4-20mA output.	• External circuit resistance too high. • ΔP problem (ΔP scale LEDs flash). • ΔP problem (incorrect ΔP reading).	Reduce external circuit resistance (recommended range 150-250Ω). Refer to section G of Fault Location Table. Refer to section H of Fault Location Table.
IPC serial-linked control system			
K	Valves do not fire.	• Incorrect setting of valve switches in slave modules.	Ensure switches in slave modules are set for maximum number of valves fitted (refer to Fig. 15 and Table 4 in 'Maintenance' section).
L	Weak pulses.	• Air supply inadequate. • Supply voltage too low.	Check compressor capacity. Check pulse interval – air pressure in manifold should return to required value before next pulse. Check supply voltage and connections to PCB.

SPECIFICATIONS

The controller complies with the electromagnetic emissions/immunity requirements of the European Directive 89/336/EEC, together with all current world standards (e.g. BS standard for Electrical/Electronic equipment EN 60204-1).

The IPC controller consists of an IP66 weatherproof ABS enclosure and can be connected to either AC or DC input voltages. Mounted within the box is a printed circuit board, together with the appropriate number of solenoid valves (on certain dust collectors the solenoid valves are fitted in a separate box).

The IPC (ΔP) Controller has an additional PCB together with a differential pressure module and LED bar graph display.

The operating temperature range for the controller is –10°C to +60°C at 25% RH, or –10°C to +45°C at 81% RH. (For temperatures outside these limits refer to Donaldson).

Controllers for use in hazardous areas

Versions of the controller are available for use in potentially hazardous areas, as defined in EC Directive 94/9/EC (ATEX Directive).

The controllers available are:

- Category 3D equipment suitable for use in zone 22.
- Category 2GD equipment suitable for use in zone 21, zone 22, zone 2 and zone 1.

Not all controller options are available for ATEX applications.

Voltage inputs

AC supply: 105-120V, 200-240V, 1 phase, 50/60 Hz

DC supply: 24V

Voltage outputs

Solenoid valve pulses: 24V DC (88W max.)

Power requirements

AC supply: 36VA (internal fuse protection 0.4A)

DC supply: 80W (internal fuse protection 2.5A)

TABLE 6 — TERMINAL CONNECTIONS

Terminal No.	Item	Description	Remarks
IPC and IPC (ΔP) Controllers			
1	Power supply connections	240V AC	
2		110V AC	Protection strip fitted to prevent accidental connection
3		0V AC (Neutral)	
4		Protective Earth	
5		24V DC + (Positive)	Protection strip fitted to prevent accidental connection
6		24V DC – (Negative)	
7	Interrupt terminals	Inputs to connect remote switch to stop cleaning operation. Closing switch halts pulsing sequence	Use volt-free contact
8			
9	Off-line cleaning terminals	Inputs to connect remote switch to activate off-line cleaning sequence. Closing switch starts controller operation, opening switch stops controller normal operation and initiates off-line cleaning sequence	Use volt-free contact. Power supply must remain connected throughout. Terminals supplied bridged
10			
+ V1 to V12	Solenoid valve outputs	+ common connection Valve outputs 1 to 12 (Terminals not present on serial-linked systems)	24V DC
IPC (ΔP) Controller only			
11	Serial-linked controller connections	Connections to serial-linked controller module (Terminals not present on parallel-linked systems)	Connect to serial module terminal X1
12			Connect to serial module terminal X2
13			Connect to serial module terminal X3
14			Connect to serial module terminal X4
15	Alarm relay connections	Common	Alarm relay is energised in non-alarm condition. Maximum contact load 5A @ 240V AC
16		Normally open	
17		Normally closed	
18	In use relay connections	Common	Maximum contact load 5A @ 240V AC
19		Normally open	
20		Normally closed	
21	Minimum Pressure Alarm relay connections	Contacts open when ΔP < minimum pressure set point	Minimum Pressure Alarm is energised in non-alarm condition. Maximum contact load 5A @ 240V AC
22			
23	4-20mA output	+ Positive	Recommended external resistance 150-250Ω
24		– Negative	

Provides 4-20mA output proportional to measured pressure drop (0-260 daPa)

TABLE 6 (CONTINUED) — TERMINAL CONNECTIONS

Terminal No.	Item	Description	Remarks
IPC serial-linked control module			
X1	Input connections	Input connections from main IPC (ΔP) controller or other serial-linked module	Connect to IPC (ΔP) terminal 11 (or serial module terminal B1)
X2			Connect to IPC (ΔP) terminal 12 (or serial module terminal B2)
X3			Connect to IPC (ΔP) terminal 13 (or serial module terminal B3)
X4			Connect to IPC (ΔP) terminal 14 (or serial module terminal B4)
+ V1 to V12	Solenoid valve outputs	+ common connection Valve outputs 1 to 12	24V DC
B1	Output connections	Output connections to further serial-linked modules	Connect to serial module terminal X1
B2			Connect to serial module terminal X2
B3			Connect to serial module terminal X3
B4			Connect to serial module terminal X4

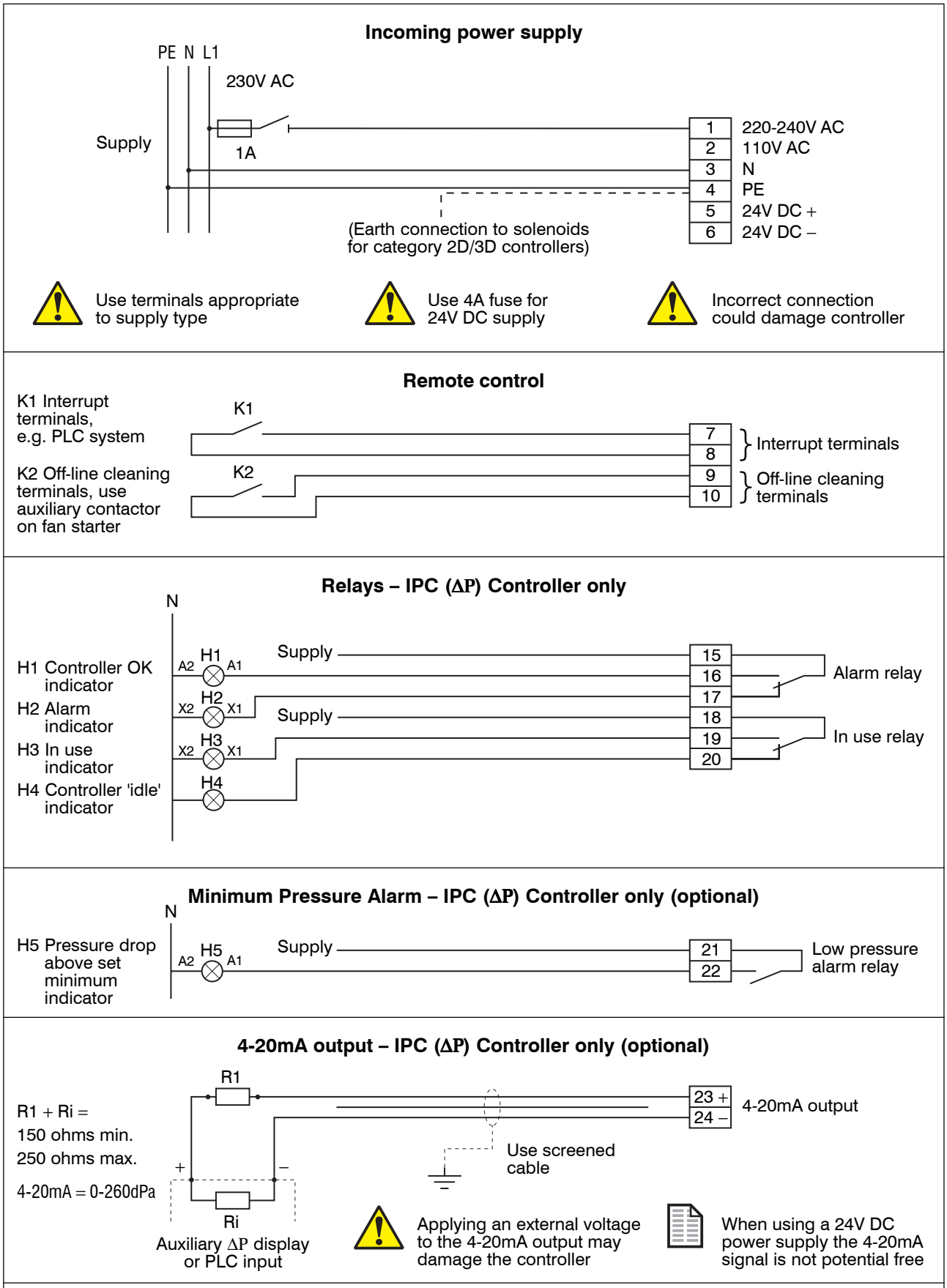


Figure 17 Typical connection diagrams for IPC Controller

SPARE PARTS

Description	IPC CONTROLLER Part Number	IPC (ΔP) CONTROLLER Part Number	IPC SERIAL-LINKED CONTROL SYSTEM Master controller Part Number	 Slave module Part Number
Base PCB	3159-1031	3159-1031	3159-1031	3159-1036
Base PCB with heater	3159-1032	3159-1032	–	–
Top PCB (inc. 4-20mA and Minimum Pressure Alarm*)	–	3159-1033	3159-1033	–
IPC (ΔP) controller upgrade kit (inc. 4-20mA and Minimum Pressure Alarm*)	3159-7413	–	–	–
Clear lid	3159-0142	–	–	–
Lid with LED bar graph display	–	3159-0143	3159-0143	–
Solenoid valve	25647-647	25647-647	25647-647	25647-647

*Minimum Pressure Alarm will only operate with software version 1.57 and above

APPENDIX A

SWITCH POSITIONS FOR IPC CONTROLLERS

Switch position	Interval	Pulse duration	Number of off-line cleaning cycles
0* (IPC (ΔP) with heater)	*	*	*
1	8 sec.	60 ms	7
2	8 sec.	100 ms	7
3	12 sec.	60 ms	7
4	12 sec.	100 ms	7
5	12 sec.	200 ms	7
6	18 sec.	60 ms	7
7	18 sec.	100 ms	7
8	25 sec.	200 ms	7
9	40 sec.	100 ms	7
A	40 sec.	200 ms	7
B	60 sec.	100 ms	7
C	60 sec.	200 ms	7
D	90 sec.	200 ms	7
E* (Base IPC)	120 sec.	200 ms	*
E* (IPC (ΔP) without heater)	4 x set interval	set interval	*
F* (IPC (ΔP) without heater)	*	*	*

* For all IPC (ΔP) settings, '0', 'E' and 'F' pulse duration and off-line cleaning cycles are set using the select + and – buttons.

Position '0': Used for IPC (ΔP) with heater only. Interval times as normal IPC (ΔP).

Position 'E': Special IPC (ΔP) settings. Interval time = 4 x that shown on setting card i.e. 20, 32, 48, 72, 100 and 120 seconds.

Position 'F': Used for IPC (ΔP). Standard interval settings.

– Entwicklung

RECO Gesellschaft für Industriefilter-Regelung mbH

EG-Konformationserklärung nach Artikel 10.1 der Richtlinie 89/336/EWG und 73/23EWG (EMV-Richtlinie, Niederspannungsrichtline)
EC-Declaration of Conformity acc. to Article 10.1 of the Directive 89/336/EEC and 73/23/EEC (EMC-Directive)
Déclaration de conformité CEE selon l'article 10.1 de la directive 89/336/CEE + 73/23CEE (Directive EMC)

Wir,

Reco GmbH

We, Ettore-Bugatti Strasse 9
Nous, 51149 Köln, Allemagne

Name und Anschrift des Herstellers oder des in der EU niedergelassenen Inverkehrbringers
Name and address of the manufacturer or of the introducer of the product who is established in the EU
Nom et adresse du fabricant ou le la personne résidant dans la CEE qui introduit le sous-dit produit de la CEE

erklären in alleiniger Verantwortung, dass das Produkt
herewith take the sole responsibility to confirm that the product
soussignés déclarons de notre seule responsabilité que ce produit

IPC (DP) and IPC (DP) 4-20mA

Typenbezeichnung und ggf. Artikel Nummer
Type designation and, if applicable, article no.
Type, nom et - si nécessaire - n° d'article du produit

mit den folgenden Normen bzw. normativen Dokumenten übereinstimmt
is in accordance with the following standards or standardized documents
est conforme aux normes ou spécifications Européennes suivantes

1.	**EN 61000-6-4:2001**	**Störaussendung EMA [RF emission]**
	EN 55011:1998 Gr. 1 Kl. A	Störspannung [conducted noise]
	EN 55011:1998 Gr. 1 Kl. A	Störfeldstärke [radiated noise]
	EN 61000-3-2:2001	Oberschwingungen [harmonics]
	EN 61000-3-3:1995 + A1:2001	Spannungsschwankungen [flicker]
2.	**EN 61000-6-2:2001**	**Störfestigkeit EMB [immunity]**
	EN 61000-4-6:1996 + A1:2001	HF-Einströmung [injected HF currents]
	EN 61000-4-3:1996 + A1:1998 + A2:2001	HF-Felder [radiated HF fields]
	EN 61000-4-4:1995 + A1:2001	Burst
	EN 61000-4-5:1995 + A1:2001	Surge
	EN 61000-4-11:1994 + A1:2000	Spannungs-Variationen [voltage variations]
	EN 61000-4-2:1995 + A1:1998 + A2:2001	ESD
3.	**EWG 73/23**	**Niederspannungsrichtlinie**
	VDE 0160	Elektronische Betriebsmittel
	VDE 0113 EN 60204 Teil 1 A1 :1998	Sicherheit Elektrischer Maschinen

Folgende Betriebsbedingungen und Einsatzumgebungen gemäß Dokumentation sind vorauszusetzen
The operating conditions and installation arrangements have to be presumed according documentation.
Les conditions d'opération et d'installation suivantes sont à respecter

Dieser Erklärung liegt der Prüfbericht zugrunde
This confirmation is based on testreport
Cette confirmation est basée sur report de test

TÜV Rheinland Product Safety GmbH, 51101 Köln, Allemagne

i. V. Robert Borgmann, Köln, 05.12.2005

Name, Anschrift, Datum und Unterschrift
Name, address, date and legally binding signature of the person being responsible
Nom, adresse, date et signature de la personne responsable

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