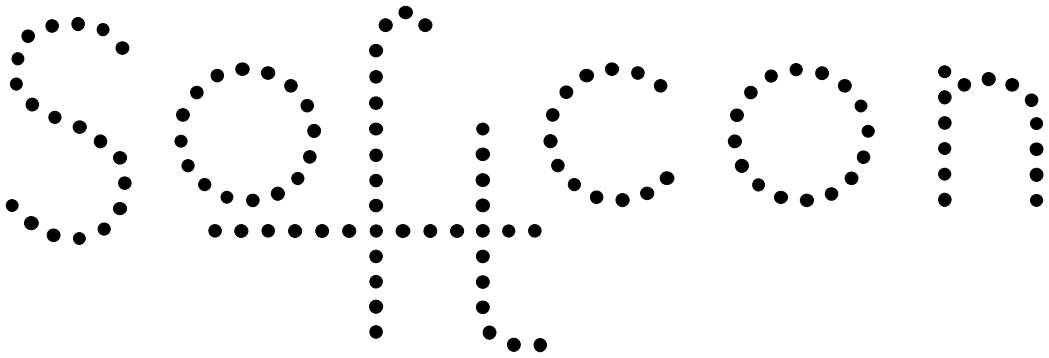

SOFTWARE CONTROL SERVICES

ADF CONTROLLER
ADF-1/DF350
INSTALLATION MANUAL

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1. INTRODUCTION

The Analogue Data Funnel controller (ADF) is a miro controlled unit which monitors the voltage level of 16 input channels and controls the status of 8 output channels. Two versions of ADF's are available, namely the ADF-1 and the DF350. Except for the housing colours, the units are identical. ADF-1 housing is cream coloured, while the DF350 housing is white.

With the addition of the ADF extender, the input and output capacity of the ADF can be extended to 48 inputs and 24 outputs.

2. SCOPE

This manual provides the installation information for the ADF-1/DF350 controller (hereafter referred to as the ADF) and its extender.

Detailed specifications and maintenance information on the ADF and on all the units which is tied to the ADF is provided in the ADF-1/DF350 technical manual. Operating procedures are given in the ADF-1/DF350 operators manual.

3. WARNINGS AND CAUTIONS

The ADF presents no hazards to any user. 220VAC is present inside the controller enclosure, and appropriate caution should be taken when the enclosure is opened. Enclosures should normally be kept locked.

Supply voltages and environmental conditions not within the defined limits (see technical manual), may cause permanent damage to the equipment. When replacing any unit in the system, the power supply to that unit must be switched off.

In installations where the equipment effect control, potential hazards may occur, depending on the item being controlled. Correct system design and implementation should eliminate such hazards, e.g. fail safe on power supply failure.

4. APPLICABLE DOCUMENTATION

The following documents are referred to, or can provide additional information: -

ADF-1/DF350	Technical manual	(A234.TM)
ADF-1/DF350	Operators manual	(A232.OM)
SDF-A/CR355	Technical manual	(A874.TM)
SDF-A/CR355	Operators manual	(A872.OM)
SDF-A/CR355	Installation manual	(A875.DOC)
PC/AT	Technical manual	(A824.TM)
PC/AT	Operators manual	(A822.OM)
PC/AT	Installation manual	(A825.DOC)

5. GENERAL INFORMATION

5.1 SYSTEMS

An ADF can be installed as a stand-alone unit or be employed in a “small LAN” or a “large LAN” system. The appendix shows the system layouts.

The LAN systems comprises of a number of ADF’s and a variety of other controller types (see SDF-A and PC/AT systems manuals) tied to a multi-drop, twisted pair LAN. In the case of a small LAN system, the master controller of the LAN is a serial data funnel controller (SDF-A), and provides operator access to the system via a terminal (visual display unit and keyboard), and effects printouts and activity reports. The large LAN system utilises a XT/AT computer as master controller and operator interface to the system.

5.2 ADF CONTROLLERS (ADF-1, DF350)

The purpose of a ADF is to monitor 16 (or 48 with the extender attached) input channels and to control the state of 8 (or 24 with the extender attached) output channels. The inputs are either 8 bit analogue inputs, or logical state input, and the outputs are high or low (details are given under “input sensors” and “output devices” below).

An ADF contains a micro-computer and functions independently. It functions according to parameters which are pre-set. Configuration parameters can be altered via, the serial data link (tied to a PC/AT or a terminal) or via a LAN controller (SDF-A or PC/AT with MUX).

Current versions of the ADF only function in LAN systems. A terminal can be tied to the ADF for test purposes. Later versions will allow the ADF to be used as a stand alone unit, not tied to a LAN. A terminal and printer would then be connected to the ADF for configuration, control and reporting functions.

5.2.1. ADF MOUNTING

The ADF enclosure has four 5mm holes in the base of the enclosure for easy mounting. Ideally the ADF is mounted at a height of 1.5m to the bottom of the housing and central to the sensors connected to it. When selecting the physical position to mount the controller, take care to avoid mounting the controller within close proximity to equipment generating electro magnetic fields (EMF). Typical EMF or noise generators are: radio transmitters, lift shafts, electric motors, electric solenoids, transformers, distribution boxes, fluorescent lights, etc. Mount the ADF so that the diagnostic light emitting diodes (LEDS) are easily visible. Utilise the 20mm knockouts on the side of the enclosure for cable entries.

5.2.2 ADF CONNECTIONS

All connections to the ADF are described in the relevant sections below. Drawings which summarise the connections are given in the appendices.

The maximum cable length to the units connected are tabled below:

LOCATION	MAX
ADF to terminal/printer	30 m
ADF to LAN controller	2000 m
ADF to PC MUX	2000 m
ADF to outputs	X m
Sensors to ADF	X m

Lengths to outputs and sensors depends on the voltages and currents required at the outputs and required to be measured of the inputs. The longer the cables, the smaller the range that could be measured. For example, a door contact tied to a short cable is measured at 0 or 24v, and with a long cable, as 5 or 24v.

The maximum lengths tabled above could be exceeded in certain instances, and depends on cable resistance, electrical noise, etc., this could only ascertained when installed.

All cables carrying data at 5v levels, i.e. the LAN cable and certain input cables, must be screened cables, with the screen tied to earth.

5.3 INPUT SENSORS

The voltage of the inputs are converted to digital values via analogue to 8 bit digital conversions. The values of the conversions vary between of 0 to 255 as the devices tied to inputs change state. Devices are either logical state units, e.g. door contacts which are open or closed, or devices which measure scales, e.g. temperature measurement units measuring a temperature of 0 to 100 degrees C with a resolution of 0.5 degrees. Change detected in the logical state or in the scale measurements, are reported to the LAN.

The units or devices tied to the inputs are referred to as tranducers or sensors and are either passive devices (do not supply a voltage or current) such as door contacts, or active devices (supply differing voltage or current as the state of condition being monitored changes. The ADF can supply a voltage to each input channel via a resistor, to power the tranducer, which in turn clamps the voltage according to condition of the measurement. Typically a door contact is either open (a high voltage is measured) or closed (a low voltage is detected). A smoke sensor supplied with 24v normally clamps the voltage to 20v, and when smoke is detected, clamps the voltage to 3v. Active devices provide a voltage (e.g. 0 to 10v) or a current (e.g. 4 to 20mA), proportional to the condition that it is measuring.

The ADF PCB contains a resistor network per input channel, providing a voltage to the input and converts the input voltage or current to levels required by the PCB (5v maximum). No amplification is done. A typical input is:

The values of the resistors and the voltage generated for the input and the reference voltages for the converter influence the conversion scale. Details are given under "power supplies" below.

When the input is a logical state input (not an analogue input), up to 5 logical levels can be detected. Certain sensors such as smoke sensors effectively generate 5 levels, others, such as contacts, generate two levels only (open or closed). By the addition of one or two termination resistors at such sensors, cable conditions could be monitored. The options are:

5.3.1 INPUT SENSORS MOUNTING

Mounting of the sensors depends on the type of sensor. Mounting information is supplied with the sensor. Termination resistors should be installed within the sensor housing, preventing tampering.

5.3.2 INPUT SENSORS WIRING

The output of the sensor is tied to the two terminals corresponding to the input of the ADF required to monitor the sensor. Cables to analogue sensors should be screened, with the screen tied to earth at the ADF.

5.4 OUTPUT DEVICES

Each output channel is controlled to be on or off (high or low voltage). The status of the outputs are commanded by the master controller of the LAN. The outputs are typically used to switch relays which in turn provides power or not to lights, air conditioners, doors, fire extinguishers, etc. OV or a preset voltage (5 to 24VDC), common to all outputs, is output. 7 of the outputs aare “open collector darlington” transistor, capable of sinking 500mA and up to 70VDC. The other output is a potential free relay contact rated at 3A, 250VAC or 30VDS. A typical output is:

5.4.1 OUTPUT DEVICES MOUNTING

The mounting of the output device depends on the device type. Details are supplied with the device.

5.4.2 OUTPUT DEVICES WIRING

The wiring to the device is via two wires. Generally screening is not required. Note that the relay contacts are potential free and that a supply must be fed to one of the contacts if required. The other outputs do not source a voltage, and generate a ground potential when active (see diagram above). A supply must be generated at the output, or be supplied from the ADF.

5.5 POWER SUPPLIES

A “clean” power supply is required by the controller. The specification calls for 220 volt A.C. with a tolerance of plus minus 10%. In installations where the power supply fluctuates regularly or dips below 200 volts A.C. an external UPS should be installed.

Installations where the power supply fluctuates, although not excessively enough to justify the installation of a UPS, additional capacitance connected to the 12 volt DC of the controller could rectify the supply problem (35V 4700 micro farad tied between terminals 3 + and 2 -). Note that connecting the ADF controller to the same remote mains power supply as a motor and control operating a boom or roller shutter door, could cause problems because of the excessive mains variations as the motor

switches “on” and “off”. A mains UPS or a DC UPS (nominally 12VDC and 24VDC) can be utilised.

A “clean power supply” is generally utilised in buildings for computers. The ADF controllers should be connected to that supply.

Signal ground must be isolated from earth, i.e. no links between ground and earth (the housing is earthed). The regulators must be isolated from the housing via mica washers and plastic grommets/washers.

The voltage supplied to the inputs and which is available for output is set via the potentiometer (pot1) on the PCB. This voltage is adjustable to be between 5 and VDC. Setting the voltage above 24VDC could cause over heating of on-board resistors and damage to certain components. As indicated on the input circuits above, the converter component requires 0 to a maximum of 5V. The PCB is generally delivered with resistors values have to be installed. The full scale of the conversion of the signal is determined by the voltages generated by the following components:

The inputs are converted and compared to the - REF voltage (count of 000) to the +Ref voltage (count of 255). Generally the PCB is installed with components to set - REF is at 0.7V and +REF at 4.9V. This effectively results in a 0 to 24V being converted to 0 to 255. Should the input supply voltage be set to 12V and none of the components changed, the 0 to 12V will convert to 0 to 128. Reducing the +REF voltage to 2.5v (by changing Z1 to a 2.5V device), will result in 0 to 12V being converted to 0 to 255. Alternatively, the resistors in the input circuitry could be changed.

Supplying DC to an ADF via long cables should be avoided and additional capacitance is generally required at the ADF when supplying DC.

The ADF generates a supply for inputs and outputs. This common voltage is variable by setting the potentiometer on the PCB and can be set to between 5 and 24VDC at a total of 2A. External supplies should be used if the requirements exceed these values. The relay contacts are rated at 3A 30VDC and 3A 250VAC.

5.5.1 POWER SUPPLY MOUNTING

The external 220/240VAC supplies are fed through a line filter (reducing noise from and to the mains supply) to the transformer installed in the ADF housing. UPS mains supply is mounted externally.

Installations requiring DC main supplies, or supplies not generated by the ADF, must be generated externally. External DC supplies could be mounted in matching ADF housing. DC supplies must be mounted in close proximity to the ADF, alternatively, suitable cables and voltages must be used.

5.5.2 POWER SUPPLY CONNECTIONS

When using mains supply (220/240VAC), the supply is connected to the three terminal block mounted on to the enclosure, with earth tied to the centre terminal and live and neutral to the outer terminals (not polarity sensitive). Mains UPS is connected to the same terminals.

When supplying DC, an earth connection must be made to the centre terminal of the 3 terminal "mains" connector, which it connected to the enclosure via the mains filter. DC is supplied to the ADF PCB via terminals 2 (ground) and 3 (+12V for the PCB) and for DC inputs and outputs to terminal 4 (+ 24 supply) and terminal 2 (ground).

5.6 TERMINAL

A VT100 compatible terminal, with serial RS232 communications, can be tied to the ADF. The terminal is used to test the ADF.

Later versions of the ADF allow the terminal to be used to configure and control the inputs and outputs of the ADF and when a printer is connected to the terminal, printouts can be requested via the terminal (see below). Activity is to be reported to the terminal and/or printer.

5.6.1 TERMINAL MOUNTING

The terminal is generally placed upon a flat surface, such as a table or desk.

5.6.2 TERMINAL CONNECTIONS

Rs 232 connections for the terminal are:

ADF TERMINAL	FUNCTION	PIN	CABLE COLOUR
12	Ground	7	Green
15	RX data	2	Blue

16	TX data	3	Red
earth	screen	none	screen

5.7 PRINTER

In later version of the ADF, a printer can be incorporated with a stand-alone ADF. The printer is used to print all transactions, only exceptions (alarms) or to make print-outs of the setup.

The printer must be 80 column and be capable of compressed print (EPSON) compatible.

A parallel or serial can be tied to the stand-alone ADF in one of two fashions: -

Connected directly to the ADF (no terminal connected), requiring a serial RS232 printer.

Connected to the terminal, requiring a serial RS232 or parallel printer, matching the auxiliary port of the terminal.

5.7.1 PRINTER MOUNTING

The printer is generally placed on a flat surface, such as a table or desk. When tied to a terminal, it is generally placed next to the terminal.

5.7.2 PRINTER CONNECTION

The connections for connecting a serial RS232 printer directly to the stand-alone ADF are:

ADF TERMINAL	FUNCTION	PIN	CABLE COLOUR
12	Ground	7	Green
15	RX data	2	Blue
16	TX data	3	Red
earth	screen	none	screen

5.8 LAN

5.8.1 LAN MOUNTING

When installing a LAN system, the software version in EPROM must be the LAN version, and the DIP switch of the PCB must be set to the appropriate node address (see “Jumper and DIP switch” section below).

The mounting of the LAN controller is described in the installation manual of the LAN controller.

The running of the LAN cable must be such as to avoid electrical interference (see “cabling” below).

5.8.2 LAN CONNECTIONS

RS 485 connections are:

ADF Terminal	Function	Cable Colour
12	Ground	Yellow & Green
13	Data	Red
14	/Data	Blue

The screen on the LAN must only be connected to mains earth at one point, preferably at the LAN controller.

LAN cable stubs must be avoided, i.e. no T-joints must be made and the cable should be looped through each controller. Alternatively, the stubs must be of such a length that the characteristic impedance of the cable is “seen” from the joint. The two furthermost ends of the cable and all the “long” stubs must be terminated with the characteristic impedance (a resistor between the pair of wires). Generally 120 ohm is used. The ideal installation is where the LAN cable is looped through each controller, resulting in no T-joints, and two terminated cable ends only. Note that any unit can physically reside anywhere on the LAN, the LAN controllers (SDF-A or PC/XT) does not need to be installed in the centre of the LAN!

In LAN installations, the signal ground potential of the controllers need to be forced to the same potential (voltage). This can be achieved by tying the ground of the controllers to a common cable (e.g. another pair in the LAN cable). In cases where only one pair cable is installed, the screen of the LAN can be tied to all the grounds of the controllers. The proper solution is to use one twisted pair for the LAN, a second twisted pair (in the same cable) tied to the grounds of all the controllers (and master) and the screen tied to earth at one controller only (preferably at the LAN controller).

6. INSTALLATION INSTRUCTIONS

Golden Rules To Successful Installations are:

1. Avoid Electrically “Noisy” environments.
2. Keep Cable Lengths as Short as Possible.
3. Use Screened Cables.
4. Use “Clean” and Stable Mains Supply.
5. Suppress “Fly Back” at Inductive Loads.
6. Switch the Supply to Loads (not the ground return).
7. Use Common Sense.

6.1 UNPACKING

All controllers are generally delivered mounted within a steel enclosure and are wrapped in plastic. The terminals, PC’s and printer are delivered in polystyrene protection.

The serial number of the units and the version of software provided (where applicable) is written on the plastic wrapping. The keys to the ADF enclosure lock, are strapped onto the locking lever within the ADF enclosure.

6.2

6.3 INITIAL INSPECTION

A visual inspection of all units is done before and after unpacking. Defects must be reported immediately, and no defective units should be installed.

6.4 ASSEMBLY

All ***Softcon*** manufactured units are workshop assembled, fully tested.

6.5 MOUNTING

Mounting of each item is described in section 5 above for each item.

6.6 CABLING

Cables should ideally not be run in close proximity to other cables or across equipment generating noise. Where cables have to run close to or along noise generators, it is imperative to physically separate the cables from the noise equipment and cables. A 10cm separation reduces the noise factor tremendously.

Maximum cable lengths and cable types are listed below. Note that longer lengths have been used successfully under certain instances, but should be avoided.

It is suggested that cabling to analoogue tranducers be screened calbes, with the screen being tied to earth at the ADF only. The LAN cable must be screened and tied to earth at one point only, preferably at the LAN controller. Note that the LAN screen must be continuous, ie. looped through at each controller.

LOCATION	CABLE	MAX
ADF to terminal/printer	3 Core, m/s 0.2mm mylar screened	30m
ADF to LAN controller	2 Pr twisted m/s 0.2mm mylar screen	2000m
ADF to PC MUX	2 Pr twisted m/s 0.2mm mylar screen	2000m
ADF to input sensor	2 Core m/s	x m
ADF to output	2 Core m/s	x m

6.7 CONNECTIONS

An appendix lists the terminal allocations for the ADF controller.

Terminals 1 to 10 Power Supply (factory connected).
Terminals 11 to 16 Communication.
Terminals 17 to 32 Outputs.
Terminals 33 to 64 Inputs.

Connections for each peripheral tied to the ADF are listed above. Suggested cable colours to be used are also given. Diagrammatic representation of the connections are given in the appendixes.

6.8 JUMPER AND DIP SWITCHES

There are three sets of jumpers on the ADF, they are marked on the PCB as E1, E2 and E3. E1 and E3 are for selecting the size of the EPROM and RAM memory IC's respectively. E2 is for selecting either RS232 (Terminal/Printer mode) or RS485 (LAN mode) and are linked as follows:

E1 EPROM size.
Pins 1 + 2 linked for 32kByte (27256) Pins 2 + 3 linked for 64 kByte (27512)
E2 COMMS RX.
Pins 1 + 2 linked for RS232 Pins 2+3 linked for RS485
E3 RAM size
Pins 1 + 2 linked for 32kByte (x256/7) Pins 2 + 3 linked for 8kByte (X64/5)

When selecting RS232 all switches on SW1 must be switched to the "off" position.

7. PRE-START CHECKS

Before starting up, all wiring must be checked for correctness. Note that faulty wiring could permanently damage the equipment.

In LAN installations, all node addresses on the ADFs must be preset to the appropriate address. No two units on LAN may have the same address. ADF addresses start at the number after the address of the last Card Reader Controller tied to the LAN and run consecutively.

In non LAN installations, the node address switches must all be switched off.

The connection information provided within the lids of the controllers indicate the node address and terminal information.

8. STARTING UP

In the terminal mode, the printer and terminal are switched on before or at the same time as the ADF (see below). This also prevents the loss of data printed on power-up.

9. IN OPERATION

In the terminal mode, the ADF transmits a identification request to the terminal on power-up. If the terminal responds correctly, the terminal mode is selected, if an incorrect or no response is given (e.g. the terminal is not connected or switched off), the printer mode is selected. Reverting the ADF to the terminal mode, requires that the ADF be reset (by momentarily short circuiting the reset pins on the PCB) or be re-powered up, with the terminal connected.

Refer to the operators manuals for operating and configuration instructions.

10. CLOSING DOWN

Should a unit required to be switched off, the power supply to the unit is simply turned off.

Note that when controllers are powered-down, the outputs are not active, resulting in non-control (e.g. doors may be locked or unlocked permanently, depending on the lock type used and on the installation).

11. ERROR DETECTION

Error detection is limited to the observation that the controller is not functioning “normally”, i.e. one of the following is not correct:

11.1 FUNCTIONAL INDICATORS

The “Running” LED on the controller housings flashes approximately every second, indicating that the unit is functional. An off or steady-on LED indicates an error.

The “Comms” LED on the enclosures indicates the status of the serial communications. In LAN installation, a steady-on LED indicates that comms is correct, while a flashing or off LED indicates that comms is correct, while a flashing or off LED indicates that comms is intermittent or “Down”. In the non-LAN mode, the COMMS LED flashes whenever the controller communicates with the terminal or printer. In the terminal mode, the LED flashes every second, when the time on display is updated.

12. REPAIR

Repair actions taken by the operator are limited to ensure that the power to the ADF is switched on.

ADF-1 TERMINAL ALLOCATION

NO	FUNCTION	NO	FUNCTION	NO	FUNCTION
1	+5	26	Output 6	51	Switched gnd (input 1)
2	Ground	27	Output 1 Relay contact	52	Switched gnd (input 2)
3	Quasi DC PCB supply	28	Vopt (output 2)	53	Switched gnd (input 3)
4	Quasi DC User supply	29	Vopt (output 3)	54	Switched gnd (input 4)
5	Vopt	30	Vopt (output 4)	55	Switched gnd (input 5)
6	Vopt sat	31	Vopt (output 5)	56	Switched gnd (input 6)
7	AC supply	32	Vopt (output 6)	57	Switched gnd (input 7)
8	AC supply	33	Vopt (output 7)	58	Switched gnd (input 8)
9	AC supply	34	Vopt (output 8)	59	Switched gnd (input 9)
10	AC supply	35	Input 1	60	Switched gnd (input
11	Ground	36	Input 2	61	10)
12	/Output enable	37	Input 3	62	Switched gnd (input
13	DATA LAN	38	Input 4	63	11)
14	/DATA LAN	39	Input 5	64	Switched gnd (input
15	RX RS232	40	Input 6	65	12)
16	TX RS232	41	Input 7	66	Switched gnd (input
17	RTS	42	Input 8		13)
18	/RTS	43	Input 9		Switched gnd (input
19	Output 1 Relay contact	44	Input 10		14)
20	Output 2	45	Input 11		Switched gnd (input
21	Output 3	46	Input 12		15)
22	Output 4	47	Input 13		Switched gnd (input
23	Output 5	48	Input 14		16)
24	Output 6	49	Input 15		
25	Output 5	50	Input 16		

ADF-1 LINK ALLOCATION

E1 1-2 27256 EPROM
2-3 27512 EPROM

E2 1-2 RS232 (Terminal)
2-3 RS485 (LAN)

E3 2-3 6264 SRAM
1-2 62256 SRAM

E4 1,2,4,5,6,8 not used (OFF)
3 On for external EPROM
7 ON for Terminal
OFF for LAN

E5 TERMINAL all off
LAN 1 on = 1
2 on = 2
3 on = 4
4 on = 8
5 on = 16
6 on = 32
7 on = 64
8 on = 128