METRIX

DATAWATCH IX

Installation Guide

Datawatch IX is a panel mount instrument that combines graphical recording with four or eight high accuracy universal analogue inputs for data recording and alarming. Secure recording and archiving strategies provide compliance with industry standards.

Features and Benefits:

- 1/4" DIN Mounting
- VGA crystal clear display
- Modbus TCP/IP over Ethernet
- Webserver
- OEM security
- 1 logic input
- 2 relay outputs
- Bargraph, trend and numeric display
- Automatic data recording
- High accuracy universal inputs
- USB removable data storage facility
- Compact design
- 50MB flash memory
- 30 virtual channels and modbus inputs
- Multiple I/O options

SAFTEY NOTES

Warning: Any interruption of the protective conductor inside or outside the apparatus, or disconnection of the protective earth terminal is likely to make the apparatus dangerous under some fault conditions. Intentional interruption is prohibited.

Safety requirements for permanently connected equipment state:
• A switch or circuit breaker shall be included in the building installation
• It shall be in close proximity to the equipment and within easy reach of the operator
• It shall be marked as the disconnecting device for the equipment.
• Recommended external fuse ratings: For 100–230 V ac, fuse type: T rated 2 A 250 V

1. Before any other connection is made, the protective earth terminal shall be connected to a protective conductor. The mains (supply voltage) wiring must be terminated in such a way that, should it slip, the earth wire would be the last wire to become disconnected.

2. Whenever it is likely that protection has been impaired, the unit shall be made inoperative, and secured against accidental operation. The manufacturer's nearest service centre should be contacted for advice.

3. Where conductive pollution (e.g. condensation, carbon dust) is likely, adequate air conditioning/filtering/ sealing etc. must be installed in the enclosure.

4. Signal and supply voltage wiring should be kept separate from one another. Where this is impractical, shielded cables should be used for the signal wiring.

5. If the unit is used in a manner not specified by the manufacturer, the protection provided by the equipment might be impaired.

6. Installation must only be carried out by suitably qualified personnel.

7. To prevent hands or metal tools touching parts that may be electrically live, the unit must be installed in an enclosure.

Caution: Live sensors. The unit is designed to operate if the temperature sensor is connected directly to an electrical heating element. However, you must ensure that service personnel do not touch connections to these inputs while they are live. With a live sensor, all cables, connectors and switches for connecting the datawatch must be mains rated for use in 240 Vac CAT.

Caution: Wiring: It is important to connect the unit in accordance with the data in this sheet ensuring that the protective earth connection is ALWAYS fitted first and disconnected last. Wiring must comply with all local wiring regulations, i.e. UK, the latest IEE wiring regulations, (BS7671), and USA, NEC Class 1 wiring methods. Do not connect ac supply to low voltage sensor input or low level inputs and outputs use auxillary 24Vdc supply.

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8. The maximum continuous voltage applied between any of the following terminals must not exceed 240 Vac:
— relay output to logic, dc or sensor connections;
— any connection to ground.
The unit must not be wired to a three phase supply with an unearthed star connection. Under fault conditions such a supply could rise above 240V ac with respect to ground and the product would not be safe.

9. Grounding of the temperature sensor shield. In some installations it is common practice to replace the temperature sensor while the unit is still powered up. Under these conditions, as additional protection against electric shock, we recommend that the shield of the temperature sensor is grounded. Do not rely on grounding through the framework of the machine.

10. Over Temperature Protection. To prevent overheating of the process under fault conditions, a separate over-temperature protection unit should be fitted which will isolate the heating circuit. This must have an independent temperature sensor. Alarm relays within the unit will notgive protection under all failure conditions.

11. Isopropyl alcohol, water or water based products may be used to clean labels. A mild soap solution may be used to clean other exterior surfaces.

12. Before removing a unit from its sleeve, disconnect the supply and wait at least two minutes to allow capacitors to discharge. Avoid touching the exposed electronics of an unit when withdrawing it from the sleeve.

13. This unit is intended for industrial temperature and process control applications within the requirements of the European Directives on Safety and EMC.

USB Device Precautions

Note: the use of U3 USB Flash drives is not recommended.

1. Precautions against electrostatic discharge should be taken when the unit terminals are being accessed. The USB and Ethernet connections are particularly vulnerable.

2. Ideally, the USB device should be plugged directly into the unit, as the use of extension leads may compromise the unit's ESD compliance. Where the unit is being used in an electrically 'noisy' environment, however, it is recommended that the user brings the USB socket to front of panel using a short extension lead. This is because the USB may 'lock up' or reset in noisy environments and the only means of recovery is to remove the device, then reinsert it. EMCrelated failure during a write operation might cause corruption of the data held on a USB memory stick. For this reason, the data on the memory stick should be backed up before insertion and checked after removal.

3. When using a USB extension cable, a high quality screened cable must be used with a maximum length of 3 metres (10 ft.)
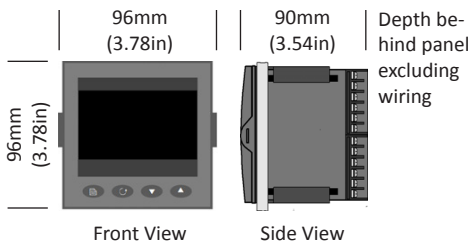
INSTALLATION

Requirements
1. The PC must be running Windows XP or Windows 7.

2. At least 1 GB RAM is required.

Procedure
1. Insert the DVD into the PC drive. The setup program should run automatically unless 'autorun' has been disabled.

2. If the DVD fails to autorun, in Windows Explorer double-click the DVD icon to see contents, then double click the setup.exe file.

3. In the Do Install section of the dialog, click the required button to start the installation.

4. Follow the instructions shown on-screen for each item of the installation.

MECHANICAL INSTALLATION

96mm (3.78in) | 90mm (3.54in) | Depth behind panel excluding wiring

96mm (3.78in)

Front View   Side View

Panel Cutout
92 mm (3.62 in) × 92 mm (3.62 in)
[both −0 +0.8 mm (0.03 in)]

Minimum inter-unit spacing
Horizontal = 10 mm (0.4 in).
Vertical = 38 mm (1.5 in)

LABELING

Symbols used on this instrument
One or more of the symbols may appear as a part of the instrument labelling.
When connecting a USB device, it must be plugged directly into the instrument. The use of extension USB leads may compromise the ESD compliance.
Observe static precautions when accessing the rear terminals. Take special care with respect to USB and Ethernet connections.

Symbol	Meaning
⚠️	Refer to User Manual for instructions.
CE	This unit is CE approved.
C N1981	C-Tick mark for Australia (ACA) and New Zealand (RSM).
C UL US LISTED 13D0 E57766	Underwriters laboratories listed mark for Canada and the U.S.
40	For environmental reasons, this unit must be recycled before its age exceeds the number of years shown in the circle.
⚡	Risk of electric shock.
ESD	Precautions against static electrical discharge must be taken when handling this unit.
⊟	Ethernet connector.
USB	USB connector.
⏚	Protective-conductor terminal (Earth)

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Restriction of Hazardous Substances (RoHS)

Product group   nanodac

Table listing restricted substances

Chinese

限制使用材料一览表

产品 nanoDAC	有毒有害物质或元素					
	铅	汞	镉	六价铬	多溴联苯	多溴二苯醚
印刷线路板组件	X	O	O	O	O	O
附属物	O	O	O	O	O	O
显示器	X	O	X	O	O	O
O	表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T11363-2006标准规定的限量要求以下。					
X	表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T11363-2006标准规定的限量要求。					

English

Restricted Materials Table

Product nanoDAC	Toxic and hazardous substances and elements					
	Pb	Hg	Cd	Cr(VI)	PBB	PBDE
PCBA	X	O	O	O	O	O
Enclosure	O	O	O	O	O	O
Display	X	O	X	O	O	O
O	Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.					
X	Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.					

Approval

Name:	Position:	Signature:	Date:
Kevin Shaw	R&D Director	K Shaw	24th July 2013

IA029470U790/2 (CN30301)

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SPECIFICATION

General

I/O types	Analogue input:	Four/Eight
	Digital input:	One
	Relay output:	Two

Environmental Performance

Ambient temperature range		
	Operating:	0 to 55°C
	Storage:	−20 to +70°C
Humidity range:	Operating:	5% to 85% RH non condensing
	Storage:	5% to 85% RH non condensing
Protection	Front panel:	IP65, NEMA 4X
	Behind panel:	IP10, NEMA 1
	Shock/Vibration:	To BS EN61131-2: (5 to 150 Hz at 1 g; 1 octave per min.)
Altitude:		<2000 metres
Atmosphere:		Not suitable for use in explosive or corrosive atmospheres
Electrical safety:		BS EN61010-1 (Installation category II ; Pollution degree 2)

Electromagnetic compatibility

Emissions	Standard units:	BS EN61326 Class B—Light industrial
	Low voltage option:	BS EN61326 Class A—Heavy industrial
Immunity:		BS EN61326 Industrial

Other approvals and compliance details

General:	CE and cUL, EN61010
PV input:	AMS2750 compliant
RoHS:	EU; China
Packaging:	BS61131-2:2007 section 6.3.3/6.3.4.

Physical

Panel mounting:	¼ DIN
Weight: Instrument only:	0.44 kg (15.52 ozs)

Operator Interface

Display:	3.5" TFT colour display (320 pixels wide × 240 pixels high)
Controls:	Four navigation pushbuttons below the display screen (Page, Scroll, Lower, Raise)

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Power requirements

Supply voltage:	
Standard:	100 to 230 V ac ±15% at 48 to 62 Hz
Power dissipation:	9 W (max.)
Fuse type:	No internal fuse fitted
Interrupt protection:	
Standard:	Holdup > 20 ms at 85 V RMS supply voltage
Low voltage:	Holdup > 10 ms at 20.4 V RMS supply voltage

Battery backup

Stored data:	Time, date
Replacement period:	Three years typical
Clock (real-time clock) data:	
Support time:	Minimum of 1 year with unit unpowered
Temperature stability:	0 to 55°C ≤ +3.5 ppm
RTC Ageing:	First year to 10 year <± 5ppm
Type:	Poly-carbonmonofluoride/lithium
	Eurotherm Part Number PA260195

> ⚠️ **Caution:** Battery may explode if mistreated. Do not recharge, disassemble or dispose of in fire.

Ethernet communications

Type:	10/100 baseT Ethernet (IEEE802.3)
Protocols:	Modbus TCP/IP master/slave, over Ethernet
Cable type:	Category 5
Maximum length:	100 metres (110 yards)
Termination:	RJ45
LEDs:	Green LED illuminated = link connected;
	Amber LED flashing shows link activity

USB port

Number of ports:	One at rear of instrument
Standard:	USB1.1
Transmission speeds:	1.5 MBit/s (low speed device)
Maximum current:	< 100 mA
Peripherals supported:	Memory stick (8 GB max), bar code reader, QWERTY keyboard

Update/Archive rates

Sample rate (input/output):	8 Hz
Trend update:	8 Hz max.
Archive sample value:	Latest value at archive time
Display value:	Latest value at display update time

Analog Input

General

Number of Inputs:	Four/Eight
Input types:	dc Volts, dc mV, dc mA, dual mA, (external shunt required), dual mV, Thermocouple, dual TC
	RTD (2-wire and 3-wire)
	Digital (Contact closure)
Input type mix:	Freely configurable
Sample rate:	8 Hz (125 ms); 4Hz (250ms) dual i/p
Conversion method:	16 bit delta sigma
Input ranges:	See Table 1 and Table 2

Mains rejection (48 to 62Hz)

Series mode:	> 95 dB
Common mode:	>179 dB
Common mode voltage:	250 V ac max.
Series mode voltage:	280 mV at lowest range; 5 V peak to peak at highest range
Input Impedance:	40 mV, 8 0mV, 2 V ranges > 100 MΩ;
	62.5 kΩ for input voltages > 5.6 V
	667 kΩ for input ranges < 5.6 V

Overvoltage protection

Continuous:	± 30 V RMS
Transient (<1ms):	± 200 V pk–pk between terminals

Sensor break detection

Type:	ac sensor break on each input giving quick response with no associated dc errors
Recognition time:	<3 seconds
Minimum break resistance:	40 mV, 80 mV ranges: 5 kΩ; other ranges: 12.5 kΩ
Shunt (mA inputs only):	1 Ω to 1 kΩ mounted externally additional error due to shunt: 0.1% of Input

Isolation: (Dual inputs are not isolated from each other)

Channel to Channel:	300 V RMS or dc (Double insulation)
Channel to com electronics:	300 V RMS or dc (Double insulation)
Channel to ground:	300 V RMS or dc (Double insulation)

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Analog Input (continued)

Low Range	High Range	Resolution	Maximum error (instrument at 25 °C)	Temperature performance
-40mV	40mV	1.9μV	4.6μV + 0.053% of reading	13 ppm of input per °C
-80mV	80mV	3.2μV	7.5μV + 0.052% of reading	13 ppm of input per °C
-2V	2V	82μV	420 μV + 0.044% of reading	13 ppm of input per °C
-3V	3V	500μV	1.5 mV + 0.063% of reading	45 ppm of input per °C

Table 1: Voltage input ranges (restricted to 2000mV if dual input mode enabled)

Resistance Input Ranges

Temperature scale: ITS90
Types, ranges and accuracies: See Table 3
Maximum source current: 200 μA
Pt100 figures

Range:	0 to 400 Ω (−200 to +850°C)
Resolution:	0.05°C
Calibration error:	±0.31°C ±0.023% of measurement in °C at 25°C ambient
Temperature coefficient:	±0.01°C /°C ±25ppm/°C measurement in °C from 25 °C ambient
Measurement noise:	0.05°C peak–peak with τ = 1.6 s input filter
Linearity error:	0.0033% (best fit straight line)
Lead resistance:	0 to 22 Ω matched lead resistances
Bulb current:	200 μA nominal

Low Range	High Range	Resolution	Maximum error (instrument at 25 °C)	Temperature performance
0 Ω	400 Ω	20 mΩ	120mΩ + 0.023% of reading	25 ppm of input per °C

Table 2: Ohms (RTD) input ranges

RTD type	Overall range (°C)	Standard	Max linearisation (°C)
Cu10	−20 to +400	General Electric Co.	0.02
Cu53	−70 to +200	RC21-4-1966	0.01
JPT100	−220 to +630	JIS C1604:1989	0.01
Ni100	−60 to +250	DIN43760:1987	0.01
Ni120	−50 to +170	DIN43760:1987	0.01
Pt100	−200 to +850	IEC751	0.01
Pt100A	−200 to +600	Eurotherm Recorders SA	0.09

Table 3: RTD type details

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Thermocouple Data

Temperature scale:	ITS90
CJC Types:	Off, internal, external, remote.
Remote CJC source:	Any input channel
Internal CJC error:	< 1°C max., with instrument at 25°C
Internal CJC rejection ratio:	40:1 from 25°C
Upscale/downscale drive:	High, low or none independently configurable for each channel's sensor break detection
Types, ranges and accuracies:	See Table 4

T/C type	Range (°C)	Standard	Max lin. error (°C)
B	0 to +1820	IEC584.1	0 to 400 = 1.7 400 to 1820 = 0.03
C	0 to +2300	Hoskins	0.12
D	0 to +2495	Hoskins	0.08
E	−270 to +1000	IEC584.1	0.03
G2	0 to + 2315	Hoskins	0.07
J	−210 to +1200	IEC584.1	0.02
K	−270 to +1372	IEC584.1	0.04
L	−200 to +900	DIN43710:1985 (to IPTS68)	0.02
N	−270 to +1300	IEC584.1	0.04
R	−50 to +1768	IEC584.1	0.04
S	−50 to +1768	IEC584.1	0.04
T	−270 to +400	IEC584.1	0.02
U	−200 to + 600	DIN43710:1985	0.08
NiMo/NiMo	−50 to + 1410	ASTM E1751-95	0.06
Platinel	0 to + 1370	Engelhard	0.02
Ni/NiMo	0 to + 1406	Ipsen	0.14
Pt20%Rh/Pt40%Rh	0 to + 1888	ASTM E1751-95	0.07

Table 4: Thermocouple types, ranges and accuracies

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Relay and Logic I/O

Output 1, Output 2 and Output 3 logic I/O and relay specification

Active (current on) current sourcing logic output (O/P1 or O/P2 only)

Voltage output across terminals:	+11 V min.; +13 V max.
Short circuit output current:	6 mA min. (steady state);
	44 mA max. (switch current)

Inactive (current off) current sourcing logic output
(O/P1 or O/P2 only)

Voltage o/p across terminals:	0 V (min.); 300 mV (max.)
Output source leakage current into short circuit:	0 µA (min.); 100 µA (max.)

Active (current on) contact closure sourcing logic input (O/P1 only)

Input current	Input at 12 V:	0 mA (min.); 44 mA (max.)
	Input at 0 V:	6 mA min. (steady state);
		44 mA max. (switch current)
Open circuit input voltage:		11 V (min.); 13 V (max.)
Open circuit (inactive) resistance:		> 500 Ω (min.); ∞ (max.)
Closed circuit (active) resistance:		0 Ω (min.); 150 Ω (max.)

Relay Contacts

Contact switching power (resistive):	Max. 2 A at 230 V RMS ±15%
	Min. 100 mA at 12 V
Current through terminals:	2 A (max.)

Digital Inputs

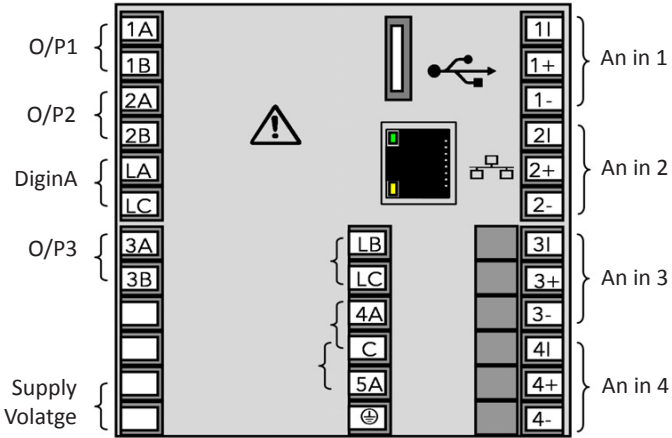Dig InA and Dig InB contact closure logic input

Contact Closure

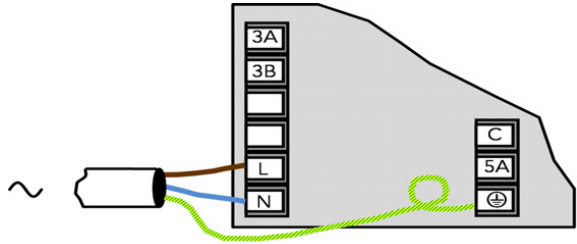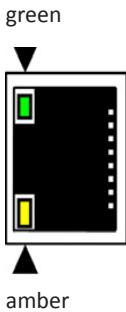|	
Short circuit sensing current (source):	5.5 mA (min.); 6.5 mA (max.)
Open circuit (inactive) resistance:	>600 Ω (min.); ∞ (max.)
Closed circuit (active) resistance:	0 Ω (min.); 300 Ω (max.)

REAR TERMINALS

O/P1	1A, 1B	1I, 1+, 1-	An in 1
O/P2	2A, 2B	2I, 2+, 2-	An in 2
DiginA	LA, LC		
O/P3	3A, 3B	3I, 3+, 3-	An in 3
	LB, LC, 4A, C, 5A, ⏚	4I, 4+, 4-	An in 4
Supply Volatge			

Main (Line) voltage supply wiring

100 to 230 Vac ±15%,
48 to 62Hz

Communications

Ethernet
(10/100baseT)

green

amber

Pin	Function
8	not connected
7	not connected
6	Rx-
5	not connected
4	not connected
3	Rx+
2	Tx-
1	Tx+

LEDs:
Green = link connected
Amber = network activity

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REAR TERMINALS
(continued)

The screw terminals accept wire sizes in the range:
Single wire 0.205 to 2.08 mm² (14 to 24 AWG). Two wires 0.205 to 1.31 mm² (16 to 24 AWG) inclusive.
Screw terminals should be tightened to a torque not exceeding 0.4 Nm (3.54 lb in).

		O/P1	
Contact closure	Logic O/P (active high)	Relay output	Isolated DC O/P (mA)

R>50Ω = inactive
R<150Ω = active

	O/P2	
Isolated DC O/P (mA)	Logic O/P (active high)	Relay output

Use copper conductors only. The power supply input is not fuse protected. This should be provided externally

O/P3		Dig In A	Dig In B	O/P4; O/P5
Relay output	Isolated DC O/P (mA/V)	Contact closure	Contact closure	Relay output

R>600Ω = inactive
R<300Ω = active
Internal link (0 V)

An In1; An In2; An In 3; An In 4					
T/C, Volts, mV	Milliamps	RTD (3-wire)	RTD (2-wire)	Ohms input	Digital input

T/C
mV
0 to 1V
0 to 10V

1R0 < R < 1k0

R>350Ω = inactive
R<200Ω = active

Dual An In1; to An In 4	
mV/TC	mA

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ENVIRONMENTAL INFORMATION

This electronic equipment was manufactured according to high quality standards to ensure safe and reliable operation when used as intended. Due to its nature, this equipment may contain small quantities of substances known to be hazardous to the environment or to human health if released into the environment. For this reason, Waste Electrical and Electronic Equipment (commonly known as WEEE) should never be disposed of in the public waste stream. The "Crossed-Out Waste Bin" label affixed to this product is a reminder to dispose of this product in accordance with local WEEE regulations. If you have questions about the disposal process, please contact Metrix Customer Services.

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