

1) Control System Overview

A fully automatic intelligent building control system, controls operates and optimises the buildings mechanical services equipment. The intelligent building controls will be installed in a control panel in the mechanical plant room.

An intuitive touchscreen (user interaction), is provided on the mechanical plant room control panel door, that will allow the intelligent building control system to be interrogated by the building occupier.

No intelligent building control system access rights will initially be set up, so free access to the system settings will be available. However the control system has the facility for password protected access rights and levels, which could be set up at any time by the building occupier if required.

The intelligent building control system operates on a stand-alone basis, but has the capability of future connection to a site wide monitoring system. The intelligent building control system is a web enabled system, so is capable of sitting on the site IT system and been viewed graphically from any connected PC. All IT works and IP addresses would need to be provided by the building occupier.

The intelligent building control systems software program is battery backed, should the power supply to the control panel fail, upon reinstatement of the power supply the control system will automatically restart and perform a self-check procedure. If a power supply failure occurs, the various items of plant will be stagger started to alleviate surges on the power supply.

Rotation of any duty / standby systems will be undertaken weekly, on a fixed time basis.

Precision Control Systems Ltd

Unit 7, High Mill Business Park, Mill Street, Morley, Leeds, LS27 0WJ

Email: info@precisioncontrolsystems.co.uk - Telephone: 07703740402

Website: www.precisioncontrolsystems.co.uk

The control system operates as an automatic, fully integrated system, but for simplicity can be viewed as various sub systems:

- Building fire alarm shut down
- HVAC system alarm
- Major water leak alarm
- Utilities metering
- Frost protection
- Air conditioning
- Ventilation
- Toilet extract
- Rain water harvesting
- Solar hot water
- Domestic hot water

Precision Control Systems Ltd

Unit 7, High Mill Business Park, Mill Street, Morley, Leeds, LS27 0WJ

Email: info@precisioncontrolsystems.co.uk - Telephone: 07703740402

Website: www.precisioncontrolsystems.co.uk

2) Control System Description

BMS Outstation & Door Mounted Touch Screen Interface

The system is controlled by an Ambiflex BMS outstation, this consists of a colour touch screen user interface mounted on the door of the control panel, and an input / output outstation mounted inside the control panel.

Various set points and time schedules are adjustable from the touch screen interface.

The BMS outstation has an ethernet port for the future connection of a front end BMS webpage menu system.

The BMS outstation comes with a built in webpage menu system that can be accessed from any smart phone, tablet or PC connected to the internet.

Graphics pages can also be installed as part of future works or a future fitout.

To be able to set up the webpage menu system a site internet data point needs to be installed adjacent to the control panel, and the site IT department will need to issue the BMS software commissioning engineer a fixed IP address, subnet mask and default gateway at the time of commissioning.

This can also be set up as part of any future works or during a future fitout.

Fire Alarm Interlock

A fire alarm interlock is incorporated in to the control panel. In the event of a fire alarm, the control panel shuts down. Fire alarm status is monitored by the BMS outstation.

Frost Protection

Outside the buildings occupancy times the building and the mechanical services equipment will be protected from adverse weather conditions by three stages of frost protection, which all act independently of each other.

If a low outside temperature occurs, all duty heating pumps will operate and all heating valves will open.

If a low room temperature occurs, all duty heating pumps, AHU and DX unit operate.

Precision Control Systems Ltd

Unit 7, High Mill Business Park, Mill Street, Morley, Leeds, LS27 0WJ

Email: info@precisioncontrolsystems.co.uk - Telephone: 07703740402

Website: www.precisioncontrolsystems.co.uk

AC System

The BMS outstation has a Modbus connection for the future installation of a Mitsubishi Blackpear interface unit which will act as an interface between the BMS and the site wide AC units, the facility for temperature readouts, setpoint adjustments, error readouts, enable and fault of each zone can be setup via the BMS touch screen and future front end graphics if required at a later date, or during a future fitout.

AHU Supply Fan

The fan is controlled by a hand / off / auto selector switch on the control panel door. In the 'hand' position the fan runs continuously.

In the 'off' position the fan is off.

In the 'auto' position the fan runs under the dictates of the BMS outstation.

Fan enabled and fault indication is provided on the control panel door and is monitored by the BMS outstation.

The fan is interlocked with the AHU inlet damper.

0-100% fan manual speed adjustment is provided inside the control panel for air balancing.

The fan is monitored by an air flow proving differential pressure switch and air flow failed condition is provided on the control panel door.

AHU Supply Air Panel Filter

Filter dirty indication is provided on the control panel door and is monitored by the BMS outstation.

AHU Supply Air Bag Filter

Filter dirty indication is provided on the control panel door and is monitored by the BMS outstation.

Precision Control Systems Ltd

Unit 7, High Mill Business Park, Mill Street, Morley, Leeds, LS27 0WJ

Email: info@precisioncontrolsystems.co.uk - Telephone: 07703740402

Website: www.precisioncontrolsystems.co.uk

AHU Extract Fan

The fan is controlled by a hand / off / auto selector switch on the control panel door.

In the 'hand' position the fan runs continuously.

In the 'off' position the fan is off.

In the 'auto' position the fan runs under the dictates of the BMS outstation.

Fan enabled and fault indication is provided on the control panel door and is monitored by the BMS outstation.

The fan is interlocked with the AHU outlet dampers.

0-100% fan manual speed adjustment is provided inside the control panel for air balancing.

The fan is monitored by an air flow proving differential pressure switch and air flow failed condition is provided on the control panel door.

AHU Return Air Bag Filter

Filter dirty indication is provided on the control panel door and is monitored by the BMS outstation.

AHU Face / Bypass Damper

The damper opens and closes under the dictates of the BMS outstation.

For example:

When the fresh air temperature is lower than the return air temperature, and lower than the supply air temperature, the damper will be in the face position to allow heat from the offices to be recycled.

When the fresh air temperature is higher than the return air temperature, or higher than the supply air temperature, the damper will be in the bypass position to stop heat from the offices being recycled.

Precision Control Systems Ltd

Unit 7, High Mill Business Park, Mill Street, Morley, Leeds, LS27 0WJ

Email: info@precisioncontrolsystems.co.uk - Telephone: 07703740402

Website: www.precisioncontrolsystems.co.uk

AHU DX Unit

The unit is controlled by a hand / off / auto selector switch and a heat / cool selector switch on the control panel door.

In the 'hand' position the unit runs continuously in either heat / cool.

In the 'off' position the unit is off.

In the 'auto' position the unit runs under the dictates of the BMS outstation.

Unit heat enabled and fault indication is provided on the control panel door and is monitored by the BMS outstation.

The unit is interlocked with the AHU supply fan air flow proving switch.

AHU Electric Heater

The heater is controlled by a hand / off / auto selector switch and a heat / cool selector switch on the control panel door.

In the 'hand' position the heater runs continuously in either heat.

In the 'off' position the heater is off.

In the 'auto' position the heater runs under the dictates of the BMS outstation.

Heater enabled and fault indication is provided on the control panel door and is monitored by the BMS outstation.

The heater is interlocked with the AHU supply fan air flow proving switch.

Rain Water Harvesting System

System fault indication is provided on the control panel door and is monitored by the BMS outstation.

System rain water pulse count and mains water pulse count is monitored by the BMS outstation.

Precision Control Systems Ltd

Unit 7, High Mill Business Park, Mill Street, Morley, Leeds, LS27 0WJ

Email: info@precisioncontrolsystems.co.uk - Telephone: 07703740402

Website: www.precisioncontrolsystems.co.uk

Solar System

The system operates via its own built in controls.

System fault indication is provided on the control panel door and is monitored by the BMS outstation.

DHWS Cylinder High Temperature Thermostat

Thermostat high temperature indication is provided on the control panel door and is monitored by the BMS outstation.

DHWS Cylinder High Temperature Safety Valve

The valve is interlocked with the DHWS cylinder high temperature thermostat.

DHWS Immersion Heaters

The two heaters are controlled by a hand / off / auto selector switch on the control panel door.

In the 'hand' position the heaters run continuously.

In the 'off' position the heaters are off.

In the 'auto' position the heaters run under the dictates of the BMS outstation.

Heaters enabled indication is provided on the control panel door and is monitored by the BMS outstation.

The heater is interlocked with the DHWS cylinder high temperature thermostat.

Precision Control Systems Ltd

Unit 7, High Mill Business Park, Mill Street, Morley, Leeds, LS27 0WJ

Email: info@precisioncontrolsystems.co.uk - Telephone: 07703740402

Website: www.precisioncontrolsystems.co.uk

DHWS Secondary Pump

The pump is controlled by a hand / off / auto selector switch on the control panel door.

In the 'hand' position the pump runs continuously.

In the 'off' position the pump is off.

In the 'auto' position the pump runs under the dictates of the BMS outstation.

Pump enabled indication is provided on the control panel door and is monitored by the BMS outstation.

DHWS Air Source Heat Pump Unit

The unit is controlled by a hand / off / auto selector switch and a heat / cool selector switch on the control panel door.

In the 'hand' position the unit runs continuously in either heat / cool.

In the 'off' position the unit is off.

In the 'auto' position the unit runs under the dictates of the BMS outstation.

Unit heat enabled and fault indication is provided on the control panel door and is monitored by the BMS outstation.

DHWS ASHP Circulation Pump

The pump is controlled by a hand / off / auto selector switch on the control panel door.

In the 'hand' position the pump runs continuously.

In the 'off' position the pump is off.

In the 'auto' position the pump runs under the dictates of the BMS outstation.

Pump enabled indication is provided on the control panel door and is monitored by the BMS outstation.

Precision Control Systems Ltd

Unit 7, High Mill Business Park, Mill Street, Morley, Leeds, LS27 0WJ

Email: info@precisioncontrolsystems.co.uk - Telephone: 07703740402

Website: www.precisioncontrolsystems.co.uk

Cold Water Booster

The booster operates via its own built in controls.

Booster fault indication is provided on the control panel door and is monitored by the BMS outstation.

Reception Alarm

Should a fault occur on any of the mechanical services plant monitored or controlled by the control system, a remote alarm with visual / audible alarm and mute button is provided in the reception.

Precision Control Systems Ltd

Unit 7, High Mill Business Park, Mill Street, Morley, Leeds, LS27 0WJ

Email: info@precisioncontrolsystems.co.uk - Telephone: 07703740402

Website: www.precisioncontrolsystems.co.uk

Pulsed Water Meter Monitoring

A total of 5 pulsed water meters are monitored by the BMS outstation, and the pulse count is visible on the BMS touch screen.

Major Water Leak Alarm

Should a leak occur in the water distribution pipework between the boundary and the buildings, a visual alarm on the main offices control panel will be operated and a visual and audible alarm in the reception will be operated.

Utility Water Meters

The following water pulse meters will be monitored in the intelligent building controls. The total monthly and half hourly consumption will be viewable in the intelligent building controls.

- Boundary water meter
- Incoming to building water meter
- Incoming to Gatehouse water meter
- Hub Office water meter 1
- Hub Office water meter 2

Modbus Electricity Meter Monitoring

A total of approximately 15 pulsed electricity meters are monitored by the BMS outstation, and the KWH count is visible on the BMS touch screen.

Utility Electricity Meters

The following electricity Modbus meters will be monitored in the intelligent building controls. The total monthly and half hourly consumption will be viewable in the intelligent building controls.

- 15 x Modbus electricity meters

Precision Control Systems Ltd

Unit 7, High Mill Business Park, Mill Street, Morley, Leeds, LS27 0WJ
Email: info@precisioncontrolsystems.co.uk - Telephone: 07703740402
Website: www.precisioncontrolsystems.co.uk

3) List Of Plant

AHU Supply Fan

3 Phase, 400VAC, 16A supply

Actual full load running current: ? Amps

AHU Extract Fan

3 Phase, 400VAC, 16A supply

Actual full load running current: ? Amps

AHU Electric Heater

3 Phase, 400VAC, 63A supply

Actual full load running current: 41.74 Amps

AHU DX Unit

Actual full load running current: ? Amps

DHWS Air Source Heat Pump

Actual full load running current: ? Amps

DHWS ASHP Circulation Pump

1 Phase, 230VAC, 6A supply

Actual full load running current: ? Amps

DHWS Immersion Heater 1

Actual full load running current: 12.00 Amps

DHWS Immersion Heater 2

Actual full load running current: 12.00 Amps

DHWS Secondary Pump

1 Phase, 230VAC, 6A supply

Actual full load running current: ? Amps

Precision Control Systems Ltd

Unit 7, High Mill Business Park, Mill Street, Morley, Leeds, LS27 0WJ

Email: info@precisioncontrolsystems.co.uk - Telephone: 07703740402

Website: www.precisioncontrolsystems.co.uk

Cold Water Booster

Actual full load running current: ? Amps

Rain Water Harvesting System

Actual full load running current: ? Amps

Solar System System

Actual full load running current: ? Amps

4) Settings

AHU Supply Fan Air DP Switch:	50 Pa
AHU Extract Fan Air DP Switch:	50 Pa
AHU Supply Air Panel Filter Air DP Switch:	150 Pa
AHU Supply Air Bag Filter Air DP Switch:	150 Pa
AHU Extract Air Bag Filter Air DP Switch:	150 Pa

Precision Control Systems Ltd

Unit 7, High Mill Business Park, Mill Street, Morley, Leeds, LS27 0WJ

Email: info@precisioncontrolsystems.co.uk - Telephone: 07703740402

Website: www.precisioncontrolsystems.co.uk

5) Photos, Drawings, Data Sheets, Manuals & Certificates

Photos:

PCS Ltd	J0730	Control Panel
---------	-------	---------------

Drawings:

PCS Ltd	J0730 (Pages 1 - ?)	Control Panel Drawings
---------	---------------------	------------------------

Data Sheets And Manuals:

Ambiflex	MF3200	Colour Touch Screen
Ambiflex	LCDX	I/O Card
Sontay	TT-CD-A	Clamp On Temperature Sensor
Sontay	TT-S-A	Room Temperature Sensor
Sontay	TT-D-A	Duct Temperature Sensor
Sontay	UI-AA1-F	Alarm Buzzer With Mute Button
Belimo	01APS-10R	Air DP Switch
Belimo	NM24A-S	Damper Actuator

Certificates:

FAT	J0730	Factory Acceptance Test
SAT	J0730	Site Acceptance Test
COMM	J0730	Commissioning
NICEIC	J0730	Electrical Installation

Precision Control Systems Ltd

Unit 7, High Mill Business Park, Mill Street, Morley, Leeds, LS27 0WJ

Email: info@precisioncontrolsyste.ms.co.uk - Telephone: 07703740402

Website: www.precisioncontrolsyste.ms.co.uk



Precision Control Systems Ltd
 Unit 7, High Mill Business Park, High Street, Morley, Leeds, LS27 0WJ
 Email: info@precisioncontrolsystems.co.uk
 Telephone: 07703740402

Job Number: Q0997

Sheet Number: 1 Of 3

Project Title: Plot 5, East Midlands Gateway

Drawn: L.Batty

Date: 11-11-2022

Revision: A

MAINS POWER

24VAC / DC CONTROL

BY OTHERS

230VAC CONTROL

SENSOR

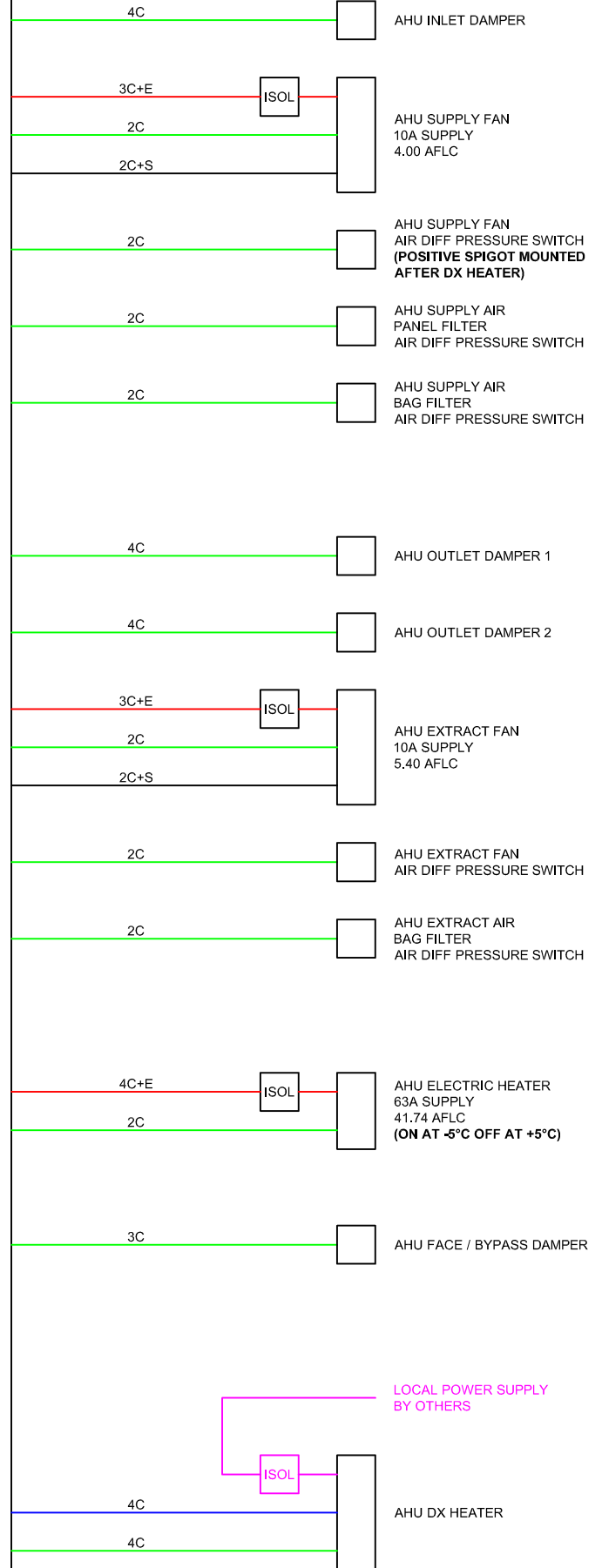
MAINS INCOMING SUPPLY
63A TPN+E 50Hz
(BY OTHERS)

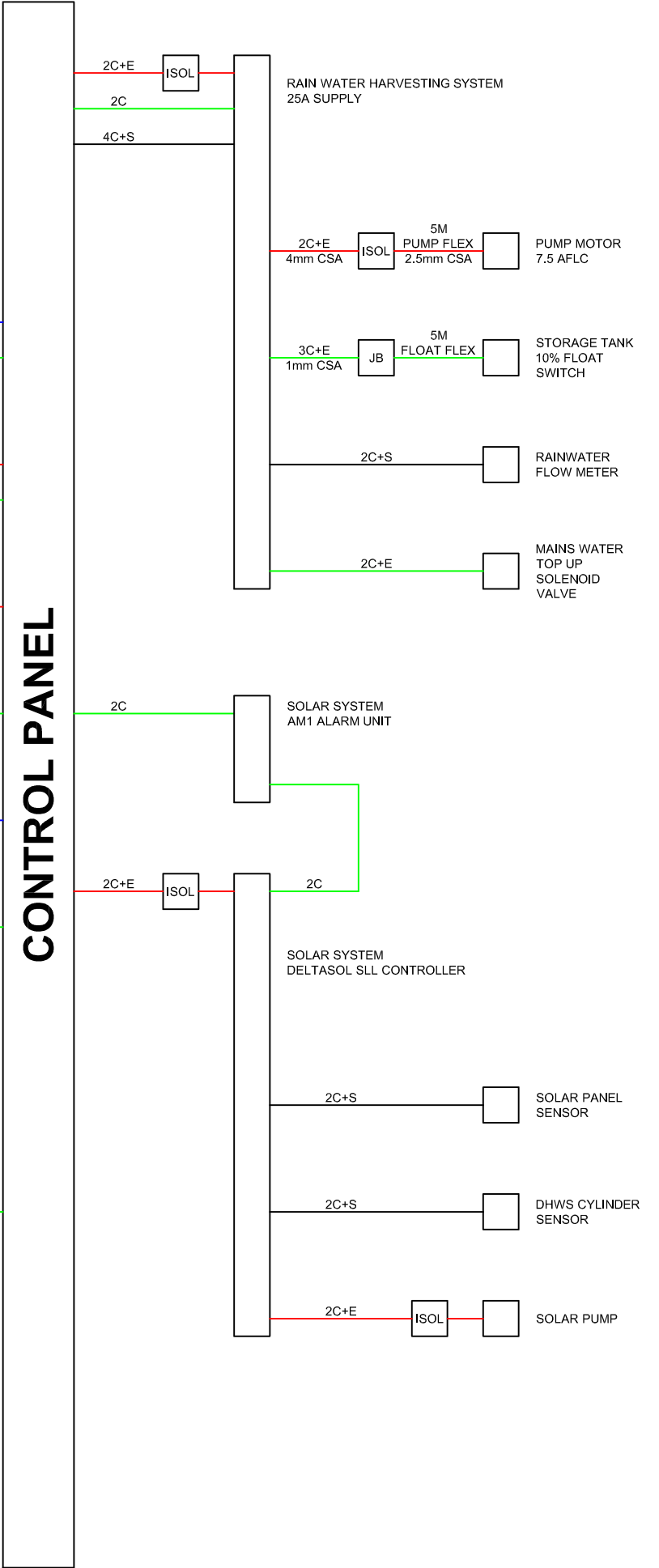
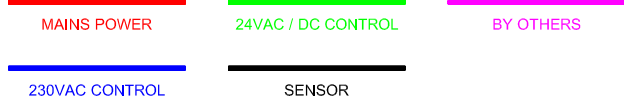
LOCAL AC
WIRING BY OTHERS

FIRE ALARM INTERLOCK

RECEPTION
BMS COMMON ALARM UNIT
AUDIBLE ALARM
RED INDICATOR
MUTE BUTTON

CONTROL PANEL





LOCAL POWER SUPPLY BY OTHERS

DHWS ASHP

DHWS ASHP CIRCULATION PUMP

DHWS SECONDARY PUMP

DHWS CYLINDER HIGH TEMPERATURE THERMOSTAT

DHWS CYLINDER HIGH TEMPERATURE SHUT OFF VALVE

COLD WATER BOOSTER

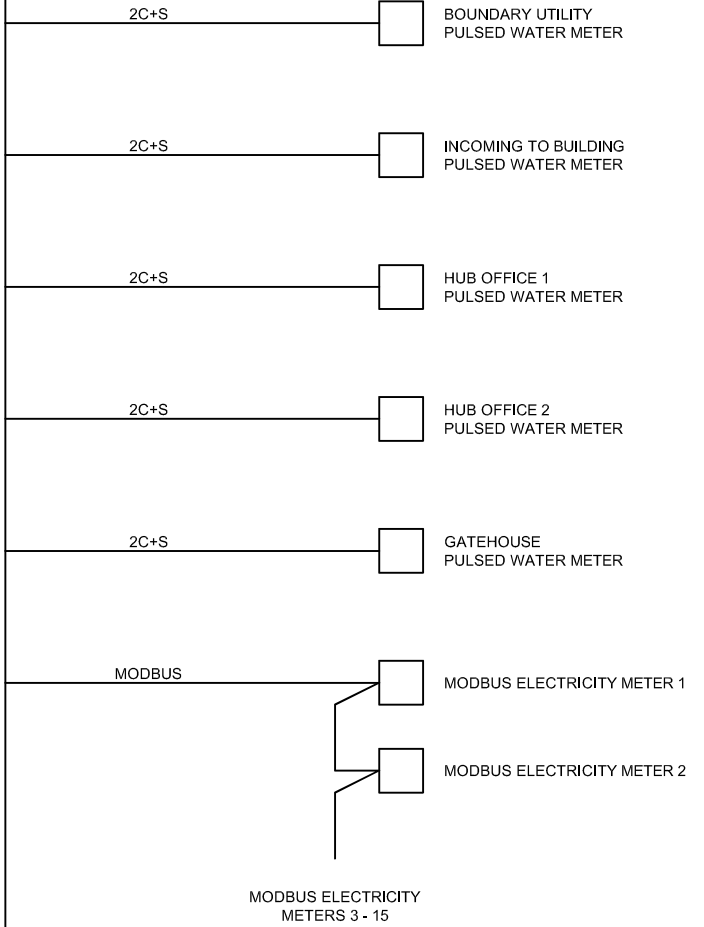
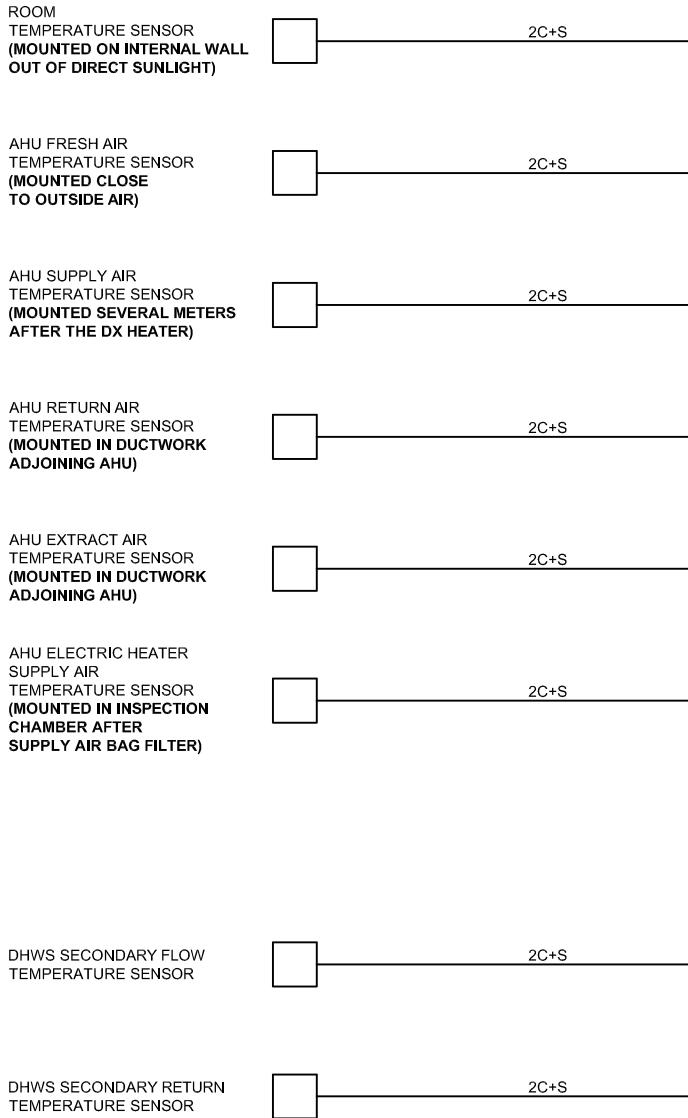
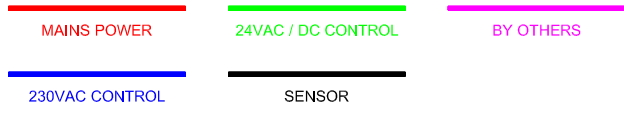
LOCAL POWER SUPPLY BY OTHERS

DHWS WATER HEATER 1

DHWS WATER HEATERS CONTACTORS BOX

DHWS WATER HEATER 2

LOCAL POWER SUPPLY BY OTHERS



Touchscreen BMS controller with integral ethernet TCP/IP



The Ambiflex MF3200 is a fully programmable modular BMS controller with integral 10/100 ethernet. Local user interface is a 5.7inch colour touchscreen supplemented by programmable dedicated user pushbuttons and alarm indication, with multi level password access control. Remote communications support password controlled remote supervision, application engineering and exception reporting. Direct web level services include user web access and email / SMS relay exception reporting.

A robust RS485 input-output bus is expandable according to system requirements up to 16 LDCX i/o modules providing up to 256 input and 192 output points per MF3200. Each controller supports up to 64 metering accumulators derived from pulse counting inputs on the i/o cards or via Modbus/RTU over a dedicated metering bus. Up to 32 MF3200 can share realtime control parameters through the seperate DSN data sharing bus.

Hardware Specification

Power Supply

230/240 50Hz, 10VA approx.

Configuration

CPU module with ethernet, colour touchscreen, USB-B local update port, RS485 i/o bus, Modbus/RTU metering bus, DSN controller data sharing bus. Max 16 i/o card, 64 Modbus meters per controller; data sharing between up to 32 CPU.

Dimensions

CPU module 250mm x 150mm x 60 mm

Electrical

Belden 4 core screened cable for i/o, metering and DSN bus.

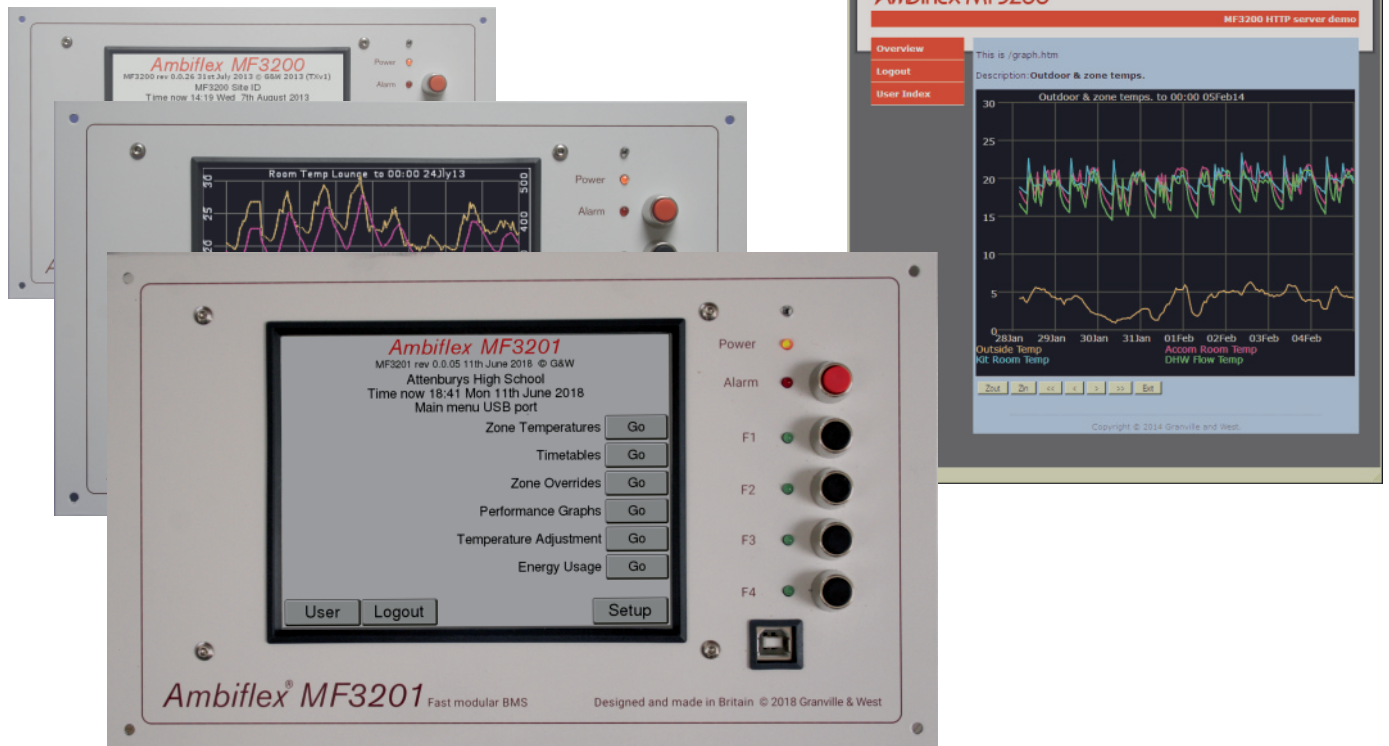
RJ45 cat5 ethernet.

USB-B CDC for on-site data collection and application updates, firmware updates.

Ambiflex MF3201

Touchscreen BMS controller with integral ethernet TCP/IP

MF3201 Data Sheet Page 1 of 6



The Ambiflex MF3201 is a fully programmable modular BMS controller with integral 10/100 ethernet. Local user interface is a 5.7inch VGA colour touchscreen supplemented by programmable dedicated user pushbuttons and alarm indication, with multi level password access control. Remote communications support password controlled remote supervision, application engineering and exception reporting. Direct web level services include user web access and email / SMS relay exception reporting.

MF3201 improves on the earlier MF3200 with a high definition touchscreen and uprated CPU.

A robust RS485 input-output bus is expandable according to system requirements up to 16 LDCX i/o modules providing up to 256 input and 224 output points per MF3201. Each controller also supports up to 96 metering accumulators each of which may be derived from pulse counting inputs on the i/o cards, via Modbus/RTU over the dedicated metering buses or from remote sources via Modbus/TCP. It can also support up to 224 analogue and binary Modbus data points. Up to 32 MF3201 can share realtime control parameters through the DSN data sharing bus.

Hardware Specification

Power Supply

230/240 50Hz, 10VA approx.

Configuration

CPU module with ethernet, colour touchscreen, USB-B local update port, RS485 i/o bus, Modbus/RTU metering bus, DSN controller data sharing bus, RS232 gateway port. Max 16 i/o card, 96 Modbus meters, 160 Modbus read and 64 Modbus write data points per controller; data sharing between up to 32 CPU.

Electrical

3/4 core 120ohm screened cable for RS485 i/o, Modbus-RTU and DSN bus.

RJ45 cat5 ethernet.

USB-B CDC for on-site data collection and application updates, firmware updates.

9D male RS232 port with support for optional external M-bus metering interface.

Dimensions

CPU module 250mm x 150mm x 70 mm

Control I/O points

Isolated RS485 i/o interface bus supporting up to 16 external LDCX cards giving up to:

- 128 measured analogue values - NTC or voltage
- 128 LV AC/DC binary input points
- 128 binary (power c/o relay) output points
- 96 analogue (0..10V) output points
- 96 local DDC control loops

RS485 bus 2 is a Modbus/RTU bus capable of accessing up to 124 low power Modbus/RTU devices.

RS485 bus 3 is configurable either as a second Modbus/RTU bus or alternatively as an Ambiflex-DSN X2 inter-controller data sharing bus, compatible with existing Ambiflex X2 type DSN networks and capable of sharing realtime control data between up to 32 MF3200 controllers.

Local User interface:

5.7inch VGA colour LCD touchscreen

Screen user functions include:

- Display of any current operating values and control zone status
- 12 x user graphs each displaying up to 6 data series from any log
- Classified user information and status points
- 16 x customised user data and control pages
- 32 x fully configurable override functions
- 32 x user adjust points
- Time schedule review and edit
- Diary schedule review and edit
- Alarm / fault / event list review
- Commissioning overrides of input and output points
- Application configuration and engineering settings

Access to all screen functions is controlled by a multi level password system.

Dedicated hardware alarm event view pushbutton
Alarm LED and AWD

4 x programmable hardware user page buttons

Optional EM200B bus-connected timer override and adjust modules.

Control functions

- Up to 384 total weekly time schedule cycles in 16 time channels each with up to 12 different timetables
- Up to 128 total diary schedule cycles in 12 event types
- Up to 16 pre-engineered time control zones with standard functions including:
 - Pre-occupancy timing
 - Start optimisation with self adaption
 - Stop optimisation
 - Duty Cycling with optional reset
 - Protection and economy limit controls from up to 30 setpoints
 - Comprehensive override options at each scheduling level

Additional general purpose control modules which can be interconnected to create most possible control functions include:

- 64 x P+I analogue control modules (SPG)
- 40 x analogue function / switching modules (AFG)
- 12 x multiplying reset generator (RSG)
- 6 x analogue profile generator (PFG)
- 400 x multi-input combination logic nodes each with with latch and timers
- 56 x analogue comparator with differential and setpoint offset
- 24 x accumulator threshold detectors
- 32 x user override controls
- 32 x user analogue adjustment points

Metering

- 96 x general purpose accumulators configurable for:
 - Pulse counting using any binary input with programmable scaling
 - Hours run from any internal logic state
 - Degree-days integrator from any analogue variables with programmable reference temperature
 - Modbus/RTU or Modbus/TCP meter value with scaling
 - M-bus meter value (requires additional M-bus interface hardware)

Logging

- 12 x energy logs, sampling intervals 15 minutes to 1 month, capacity 10 fields x 558 records each
- 4 x performance monitoring logs, sampling from 1 to 120 minute intervals, up to 20 fields x 1581 records each
- 8 x analysis logs, sampling interval from 1 to 120 minutes, 10 fields x 1518 records each
- 1 x default energy log, 2 analogue (min and max), 8 binary state, 7 accumulator, 776 daily samples
- 1 x default GP log, 18 x analogue value, 8 x binary state, 5 x accumulator, 3008 samples at 30 minute intervals

All logs can be downloaded for offboard archiving and analysis and used as data sources for onboard graphing.

Communications

- Integrated 10/100 ethernet supporting:
 - Exception reporting client
 - Email / SMS relay exception reporting client
 - Remote inspection and engineering server
 - RLD data point server
 - MODbus/TCP data exchange server
 - MODbus/TCP data exchange client
 - HTTP server

Front panel USB-B port:

- Firmware update as HID
- Application inspection and engineering as CDC

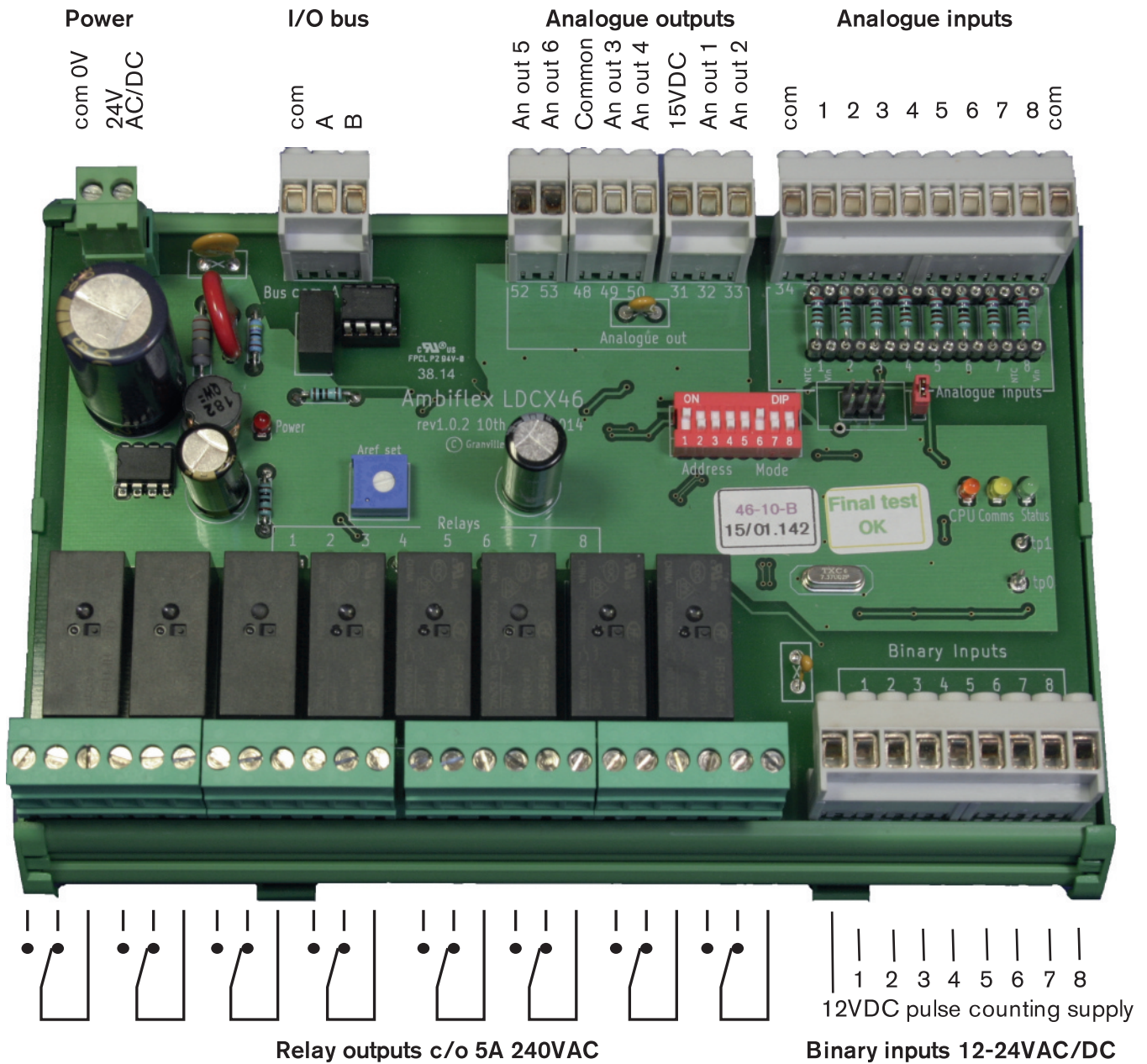
Online Security

- Remote logon protected with second level passcode
- Multi user HTTP logon with preset access level control.
- Optional peer whitelisting and bad passcode lockout on IP functions
- CMT architecture minimises operating system vulnerabilities
- Firmware can only be modified by physical access.

Application and data storage:

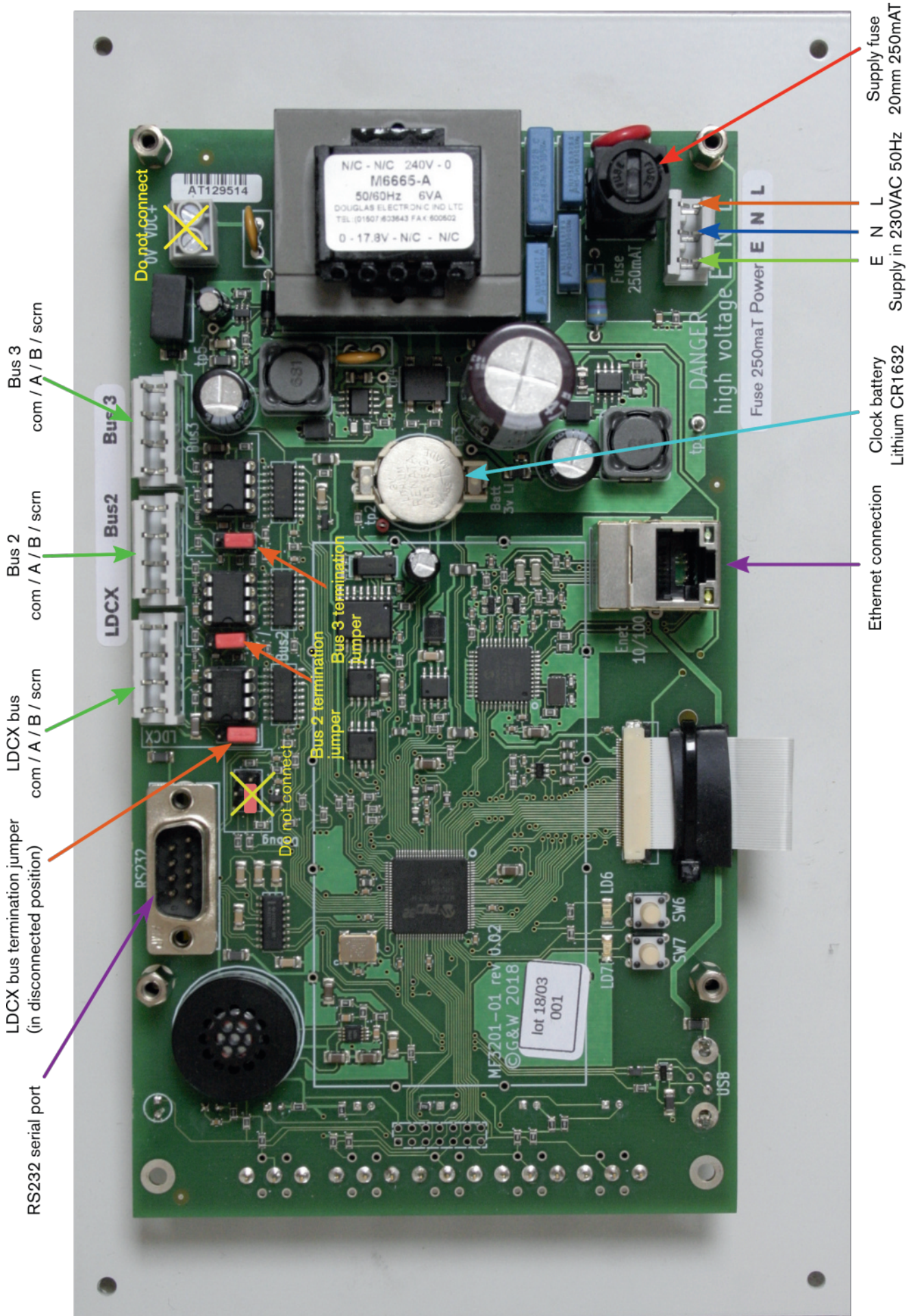
- 32 bit high integration RISC CPU
- 2 x 128MB flash, data retention > 10 years
- 1 x 128x8 Quantum Trap nvSRAM with RTC, data retention > 20 years
- Power-down clock backup: replaceable onboard lithium cell, est life > 10 years

Termination detail for LDCX46 input - output card. 1 of up to 16.



All terminations are pluggable two part connectors for easy testing and maintenance. Relay outputs and binary inputs have individual state LEDs, together with card level power, CPU, comms activity and status indicators. Onboard energy-limited low voltage supply for pulse count metering applications in critical areas. Hardware and software configurable analogue inputs support linearised NTC or user-rangeable voltage/current input signals. Integral power relays eliminate need for most external 3-point control and relay interface cards.

Termination detail for MF3201 main controller card - view on rear.



Notes:

Ambiflex Ltd
12 Attenbury's Park Estate
Attenbury's Lane, Timperley
Altrincham, Cheshire WA14 5QE

Tel: 0161 973 4411
Email: enquiries@ambiflex.com
Web: www.ambiflex.com

