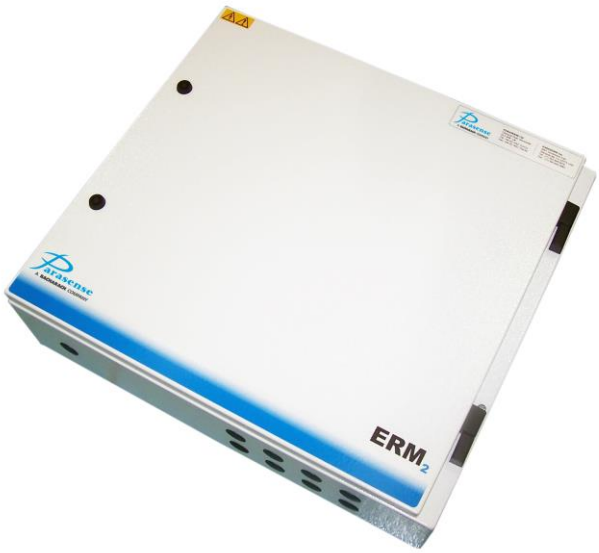

ERM2

Covers models : ERM2-104-106/ERM2-104-112
ERM2-104-106US/ERM2-104-112US

ENERGY MONITOR

OPERATION & MAINTENANCE MANUAL

Doc. Ref. MNERM2 REV. 5

reliability ° efficiency ° performance

Approvals

• EN61010:2010 • UL61010-1 • CSA C22.2 61010-1

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‘Caution, Risk of Electric Shock’ Please isolate elsewhere before opening Monitor door.

Please read this manual before installing or servicing the equipment.

TABLE OF CONTENTS

Revision	Details	Checked
2-1: 9th April 2015	New Issue	AK
3-0: 29th Sept. 2015	Modifications in line with final UL certification report. Checked box added to this table.	AK
3-1: 12th May 2016	UL specification SART details added. Quality management logo added.	AK
3-2: 15th Sept 2016	SART drawings updated. Quality management logo updated.	AK
4-0: 21st Feb 2017	Parasense Inc contact details updated. Stepwise branding removed	AK
4-1: 9th Aug 2017	SART photos and drawings updated	AK
4-2: 22nd Mar 2018	Parasense logos updated	JB
4-3: 23rd April 2018	Drawing PM2163 updated with new torque settings for 300,600 and 1200A SARTs	JB

4-4: 20th Feb 2019	Drawing PM2163 updated with new SART cable position recommendations and associated error map added	PJ
5 March 2020	Updated addresses	JH

INTRODUCTION

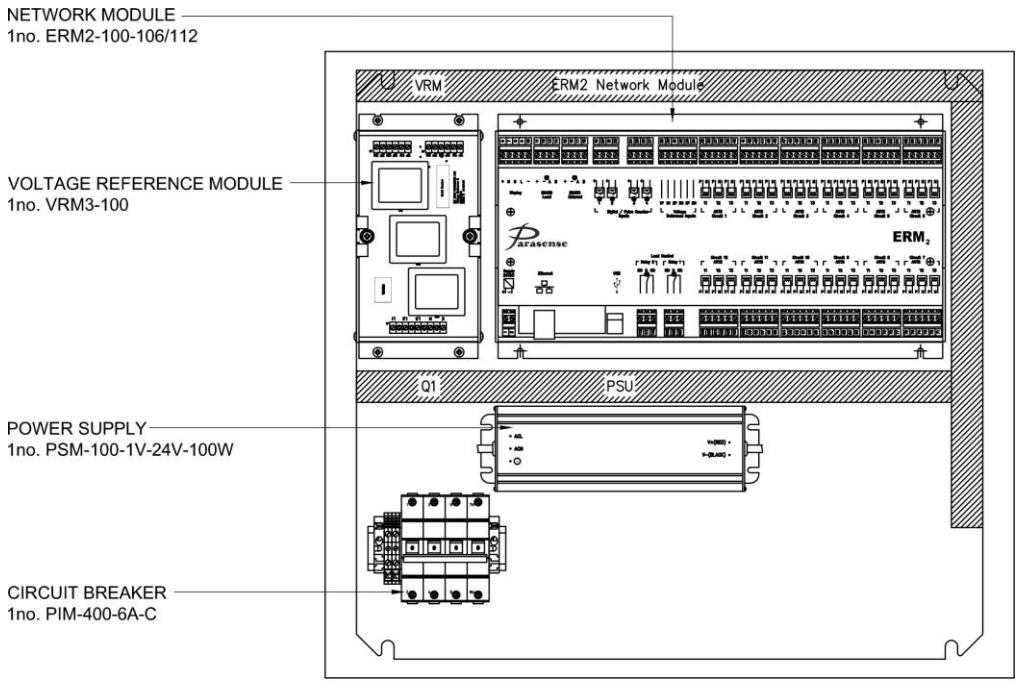
The ERM2 Energy Monitor is a multi-circuit utility monitor with standard configurations of 6 or 12 three phase circuits. Three voltage ranges are catered for that covers most commercial, industrial and military applications. Other features include:

Fault relay output – activates in the event of a loss of power or a critical fault detected in the system

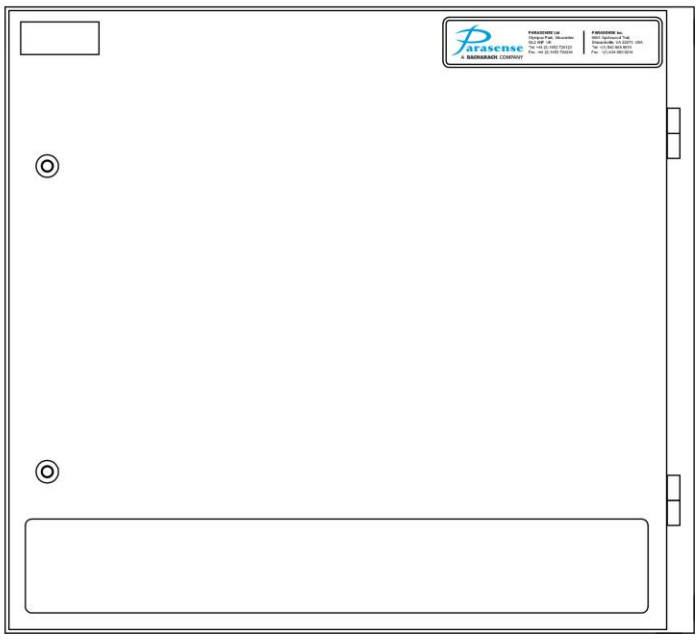
Communication interfaces – USB port for local communication, Ethernet interface for connection to local or wide area networks. RS485 ports for product extensions

Pulse counter measurement – the ERM2 can monitor up to 4 pulse counter inputs

ERM2 GENERAL ARRANGEMENT



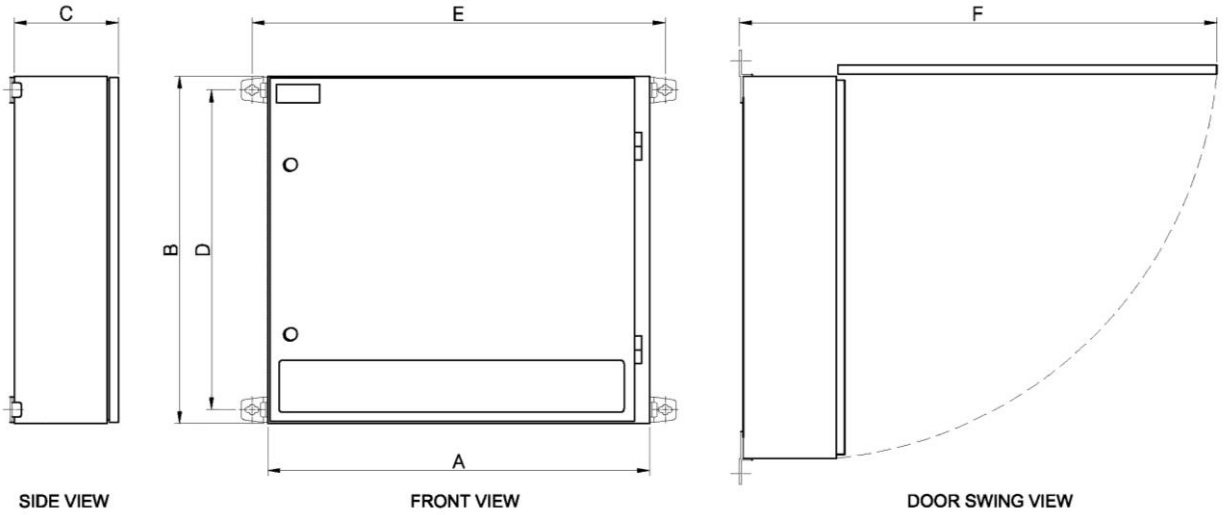
ENCLOSURE
(Door removed)



1 INSTALLATION GUIDE

Important : All installation and maintenance work must be carried out by suitably qualified personnel only. All wiring must be carried out in accordance with latest NEC, CEC or IEC requirements and current local regulations.

ERM2 ENCLOSURE DIMENSIONS AND FITTING GUIDE



ERM2	A	B	C	D	E	F	WEIGHT
Metric (mm)	550	500	150	460	595	640	20Kg
Imperial (In)	21.7	19.7	5.9	18.1	23.4	25.2	44lb

The monitor has been designed to comply with IP54. This is not intended for external use. Where possible the enclosure and cabling should be positioned in areas with similar environmental conditions

Enclosure Fitting Guide

1. It must be mounted to a solid vertical surface or structure capable of supporting the stated weight. We recommend the surface be built from concrete blocks or brick. It must be positioned where the door can be fully opened and in a location that facilitates easy service and maintenance. The top of the enclosure should not be fitted higher than 1.8m (6ft) above floor level.
2. Four fixing brackets are supplied loose with the monitor. They can be fitted vertically or horizontally. Choose the appropriate orientation, insert the bolt and nylon washer through the enclosure from the inside and tighten the bolts into the mounting brackets.
3. Fixings should be 4mm (1/8”) or 5mm (3/16”) screws or bolts minimum 40mm (1.5”) long with plain washers and suitable wall plugs
4. The enclosure is designed for cable entry from below. It has pre-drilled knock-outs for cabling. Ensure the mains cable uses the knock-out in the left end of the enclosure directly below the circuit breaker. If access is required from the side or above then the fitting must be of such a type to prevent ingress of moisture and dust. Failure to do so could invalidate the warranty.

See the appendix at the back of the manual for full installation diagrams

ERM2 ELECTRICAL REQUIREMENTS

The ERM2 requires an earthed, AC three phase mains supply in the range 208 to 480 volts, 50/60 Hz protected by a 10A DB MCB over-current circuit breaker in accordance with local electrical regulations. The supply to the ERM2 should be at the same voltage potential as the electrical circuits that are to be monitored, from the suitably marked disconnect device. The device must have 3mm contact gaps and disconnect all poles.

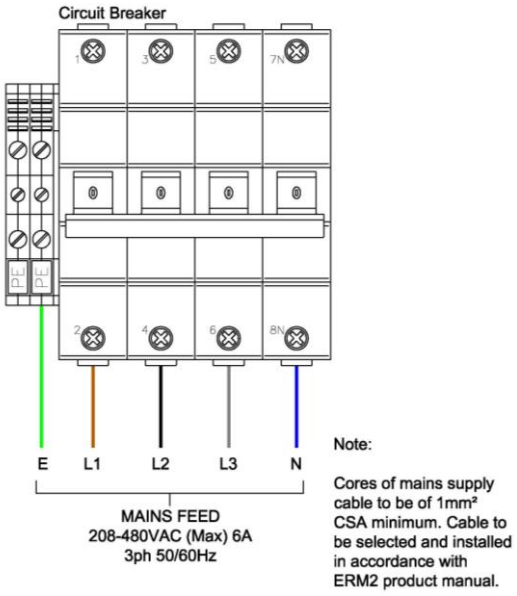
IMPORTANT:
A UL Listed Voltage Suppressor must be installed before the ERM2, between the three phases and neutral to earth with minimum ratings of 2500Vpk, type 2 suitable for the system voltage. All voltage suppressor wiring should be in accordance with the manufacturer's instructions.

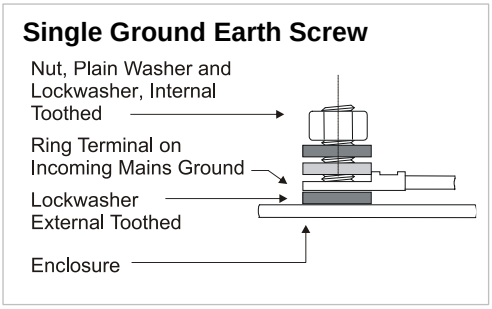
In the ERM2, it is essential that the correct phase orientation is adhered to, phase 1 to L1, phase 2 to L2, phase 3 to L3 and neutral to N. Terminate the protective earth conductor to the dedicated terminal adjacent to the circuit breaker in the panel

The final connections should be made with an approved cable (5 core 1mm^2 Controlflex Y-Y or similar) incorporating a water tight strain relief bush through the enclosure. All cabling should be suitably protected in EMC conduit.

All mains wiring connections should be readily inspected after the equipment is installed prior to power-up

Mains wiring in the ERM2 should be as per the following diagram:





Note : Circuit breaker terminals tightening torque <u>2lb.ft (2.8Nm)</u>

Cable used shall be RATED for the maximum current of the equipment, and shall be certified or approved by a recognized testing authority. The cable anchorage shall relieve the conductors of the cable from strain, including twisting, where they are connected within the equipment, and shall protect the insulation of the conductors from abrasion. The protective earth conductor, if any, shall be the last to take the strain if the cable slips in its anchorage. Cable anchorages shall meet the following requirements:

a) The cable shall not be clamped by a screw which bears directly on the cable.

b) Knots in the cable shall not be used.

c) It shall not be possible to push the cable into the equipment to an extent which could cause a hazard.

d) Failure of the cable insulation in a cable anchorage which has metal parts shall not cause accessible conductive parts to become hazardous live.

e) It shall not be possible to loosen the cable anchorage without the use of a tool.

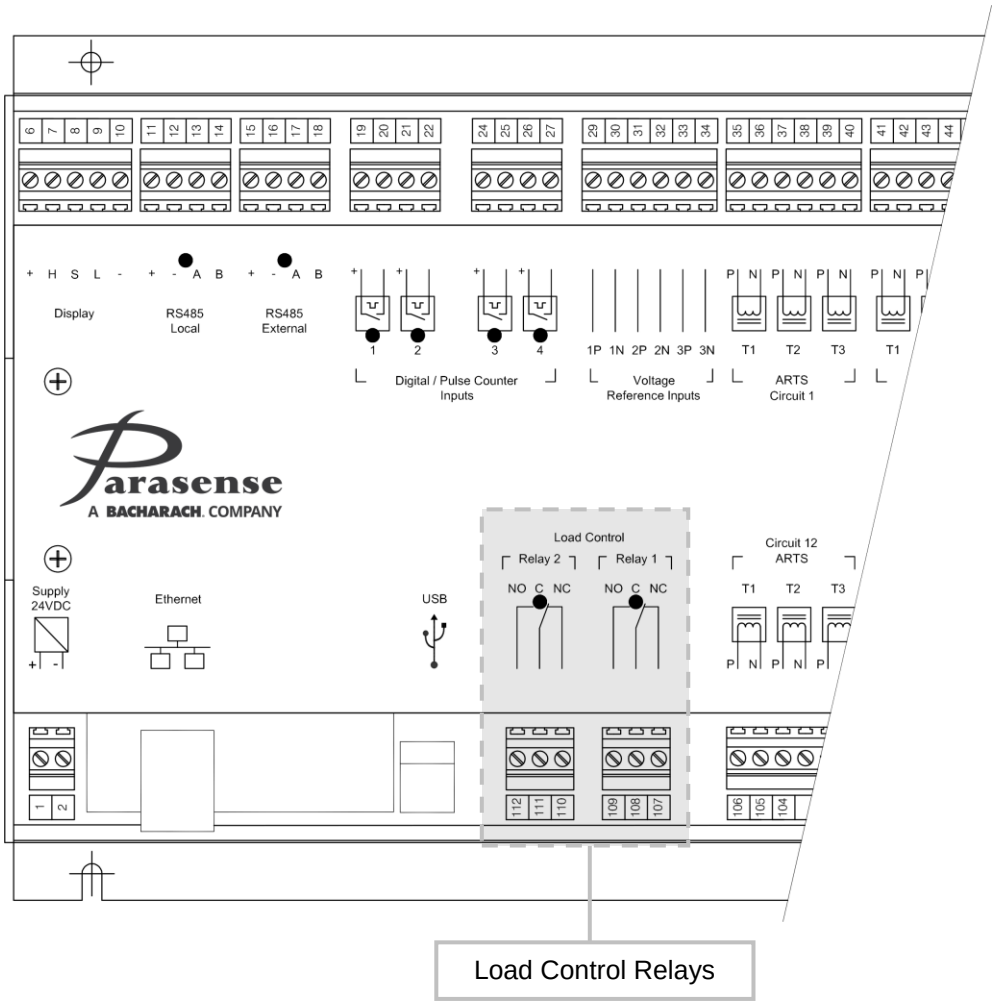
f) It shall be designed so that cable replacement does not cause a hazard, and it shall be clear how the relief from strain is provided.

A compression bushing shall not be used as a cable anchorage unless it is suitable for use with the mains supply cable supplied with it or specified for it by the manufacturer.

RELAY CONNECTIONS

Load control relays: 2 volt-free changeover relays are available on the ERM2 network module, rated at 6A AC or 5A DC (resistive). Contact voltages should not exceed 277V AC or 30V DC

Relays suitable for connection to overvoltage category II equipment only.



ERM2 DIGITAL INPUTS/PULSE COUNTERS

Four dual purpose inputs, designed to be used with volt-free contact signalling devices, are available on the ERM2. Connection information is shown in *Figure 1* below.

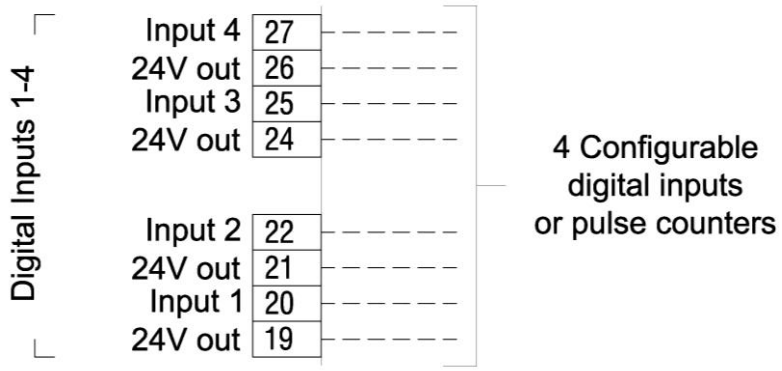


Figure 1

Each input has associated with it a 24V DC output and a 0 - 24V DC input. Signal debounce is provided to ensure accurate pulse counting. The debounce time can be configured separately for each input.

The specifications & requirements of each connection pair are as listed in *Table 1* below.

24V out (for use with volt-free contacts)	
Output voltage	24V DC
Current limit (per output)	20mA

Input 1 to 4	
Input voltage	0 – 24V DC
Logical ‘0’ input voltage level	< 2.0V
Logical ‘1’ input voltage level	> 5.0V
Maximum pulse frequency	1 KHz
Minimum pulse duration	500us
Configurable debounce time	0 – 100ms

Table 1

SART (SPLIT AUTO-RANGING TRANSFORMER) DETAILS

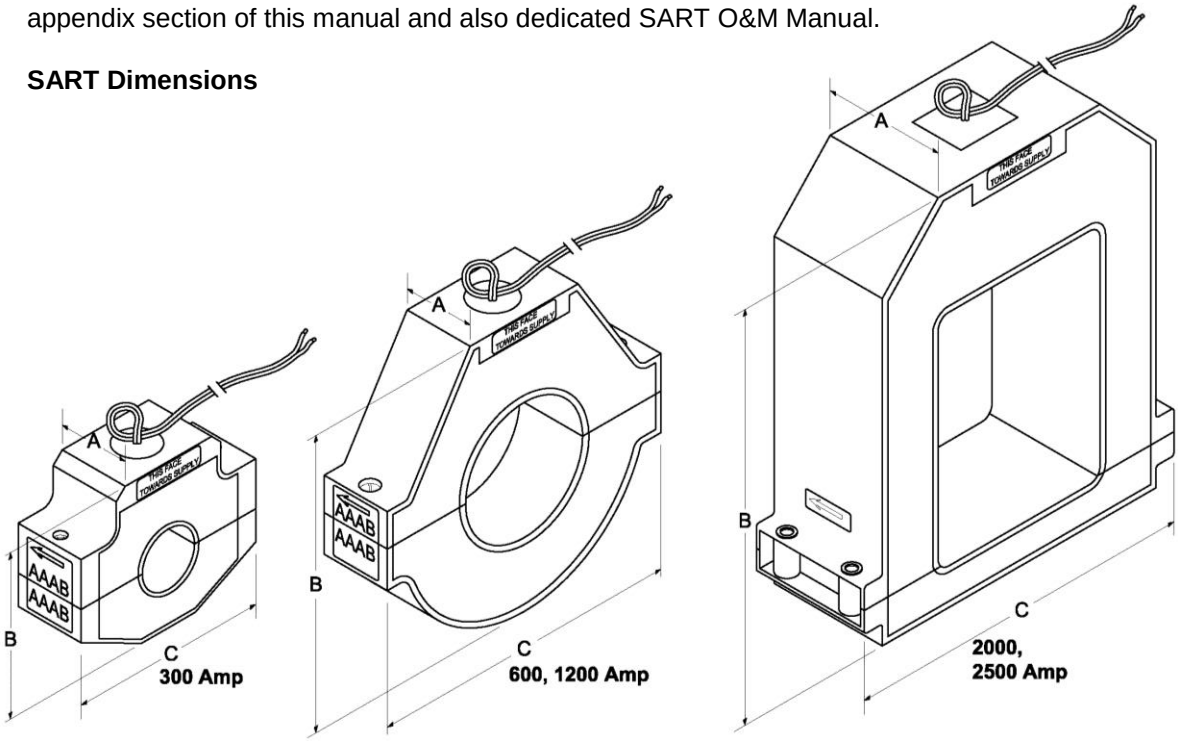
Example of 2000A SART

Example of 1200A SART

Parasense SARTs are available for 300A, 600A, 1200A, 2000A and 2500A circuits

For SART installation and wiring details please refer to drawing PM2163 sheets 1,2 and 3 in the appendix section of this manual and also dedicated SART O&M Manual.

SART Dimensions



Model	A	B	C	Hole Size
300A	1.4 (35)	3.2 (80)	3.8 (97)	1.1 (28) diameter
600A	1.4 (35)	4.7 (120)	5.2 (132)	1.9 (48) diameter
1200A	1.4 (35)	5.5 (140)	6 (152)	2.5 (63) diameter
2000A	2.4 (60)	7.9 (200)	6.8 (172)	3.6 x 4.8 (92 x 122)
2500A	2.4 (60)	9.9 (250)	8.8 (222)	5.6 x 6.8 (142 x 172)

Dimensions in inches (brackets in mm)

ENVIRONMENTAL SENSOR INSTALLATION

Environmental sensors can be installed to monitor light, temperature and relative humidity. Multiple sensors can be connected via an RS485 network. Refer for Cluster Point Networking for further details on networks.

External Temperature / Humidity Sensor

Internal Temperature / Humidity Sensor

Internal Environmental Sensor

Locate the internal sensor approximately 2.5 to 3.0 metres above the floor. The sensor should not be mounted on an external wall or near a heat source

External Environmental Sensor

In order to avoid inaccurate temperature and humidity readings, it is essential that the external sensors are installed in a location that is:

1. Shaded from sun all day, preferably on a north-facing wall
2. Well ventilated to avoid heat build up
3. Away from potential heat sources such as condensers, ventilation ducts, AHUs etc
4. Away from reflective surfaces
5. At least 2 metres above the surface

General Mounting Instructions

The external environmental sensor is housed in an IP66/NEMA 4X rated enclosure. It must be mounted to a solid vertical surface capable of supporting its weight. For full fitting instructions please refer to drawings PM1791 and PM1898 in the appendix section of this manual

Ensure the sensors are mounted where the environmental conditions are within; Temperature:-30°C/-22°F to +55°C/+131°F. Humidity: 0% to 100%, Non-condensing.

Wiring Instructions

For full wiring instructions please refer to drawings PS0639 and PS0693 in the appendix section of this manual

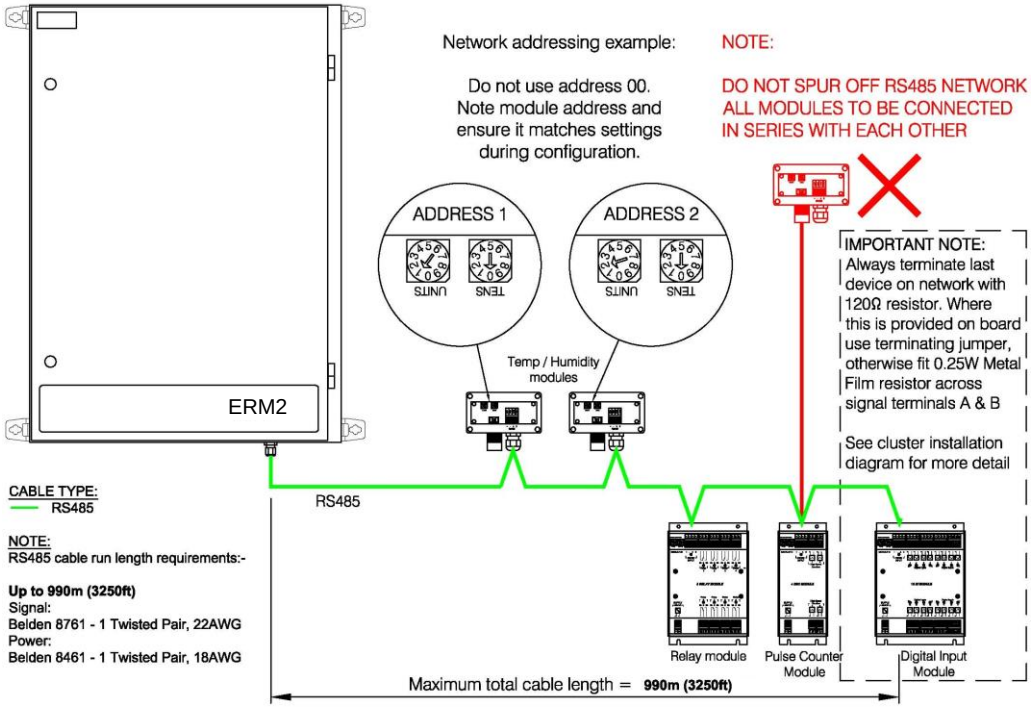
CLUSTER POINT NETWORKS

The network can accommodate multiple cluster points. Total number of cluster points available is dependent on the individual site application. For more details contact Parasense.

Each cluster point has two rotary switches enabling you to assign a unique ID number. ID numbers 01 to 99 can be assigned (Note: 00 should never be used as an ID). ID numbers do not need to follow a sequential pattern, they can be assigned in any order that you wish, but it is suggested that ID's are assigned in sequence to make the installation easier to understand.

Network installations must always be installed in series with no spur connections. The maximum possible network length is 990 metres provided that the specified cable is used and the cable is properly terminated. The diagram below outlines the method to be used when creating a network of cluster points (which includes environmental sensors, digital inputs and relay outputs etc)

Cluster Point Network Diagram



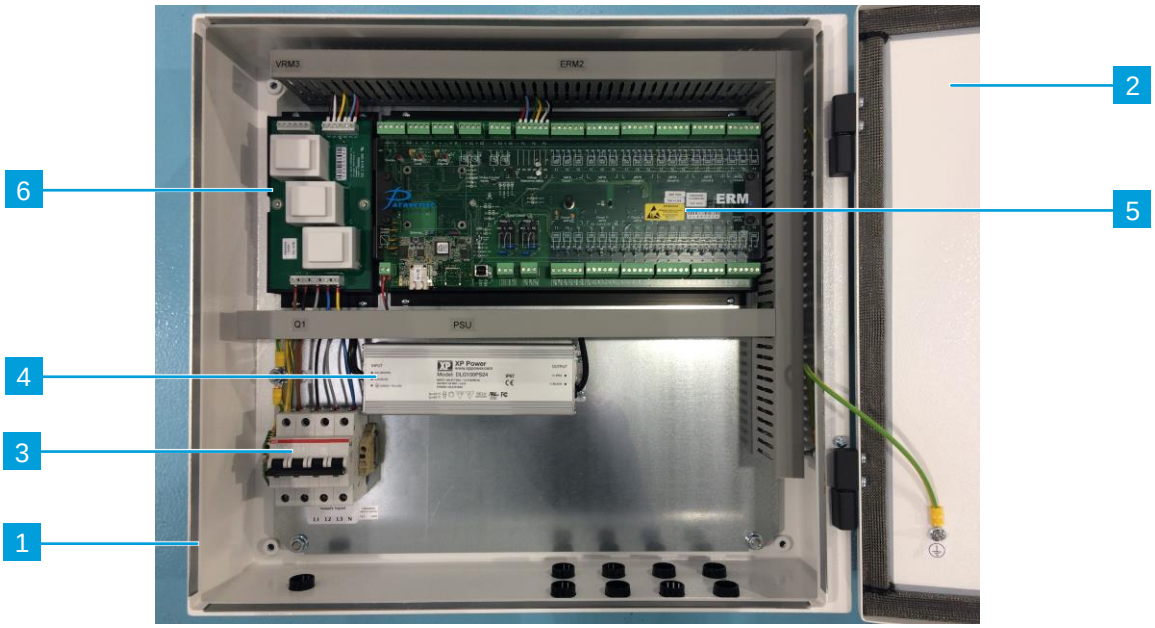
2 SERVICE & MAINTENANCE

Parasense warrants this monitor for a period of one year from the date of purchase against defects in materials and workmanship. This warranty will not apply to defects resulting from the non-compliance with this manual, over-voltage, physical abuse, ingress of water or tampering with individual items. Use of equipment in a manner not specified by the manufacturer may impair the protection afforded by the equipment.

Parasense offers a wide range of service and maintenance contracts, remote access software and management reporting packages. Details and cost of service exchange units can be obtained from Parasense or their approved distributor.

The ERM2 monitor comprises six basic building blocks:

1) Monitor enclosure
2) Enclosure door
3) Circuit breaker
4) Power supply
5) Network module
6) Voltage reference module



REPLACING THE ENCLOSURE DOOR

Switch off the mains supply to the ERM2 and wait for a few seconds while the power supply discharges. Open the door with the key provided, switch off at the internal circuit breaker **(1)** (see Figure 2.0).

Fig 2.0

Disconnect the earth strap **(2)** (see figure 2.1).

If there is one fitted, remove the anti-lift peg located above the lower hinge **(3)** (see Figure 2.1). The door can now be lifted off and a new one hung in place.

Replace the anti-lift peg. Reconnect the earth strap. Checking all connections are secure, close the internal circuit breaker and reinstate mains supply.

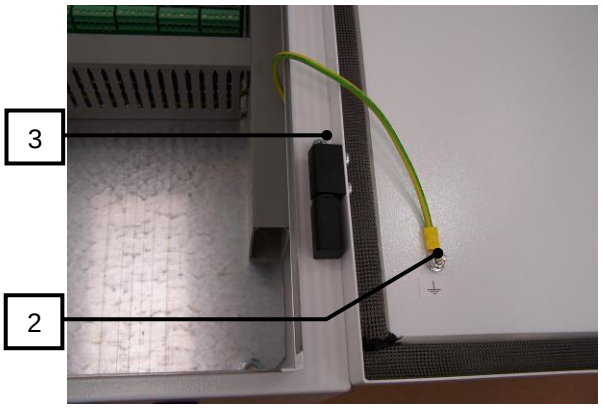


Fig 2.1

REPLACING THE NETWORK MODULE

Switch off the mains supply to the ERM2 and wait for a few seconds while the power supply discharges. Open the door with the key provided, switch off at the internal circuit breaker **(1)** (see Figure 3.0).

Fig 3.0

Noting the sequence - Disconnect the power supply cables **(2)** and any other wired in connectors **(3)**. Unscrew the four screws holding the Network Module in position **(4)**. The module can now be removed from the enclosure (see Figure 3.1).

Position the new Network Module and tighten the four fixing screws. Securely reconnect all of the cables previously disconnected. Close the internal circuit breaker, lock the enclosure door and reinstate the mains supply.

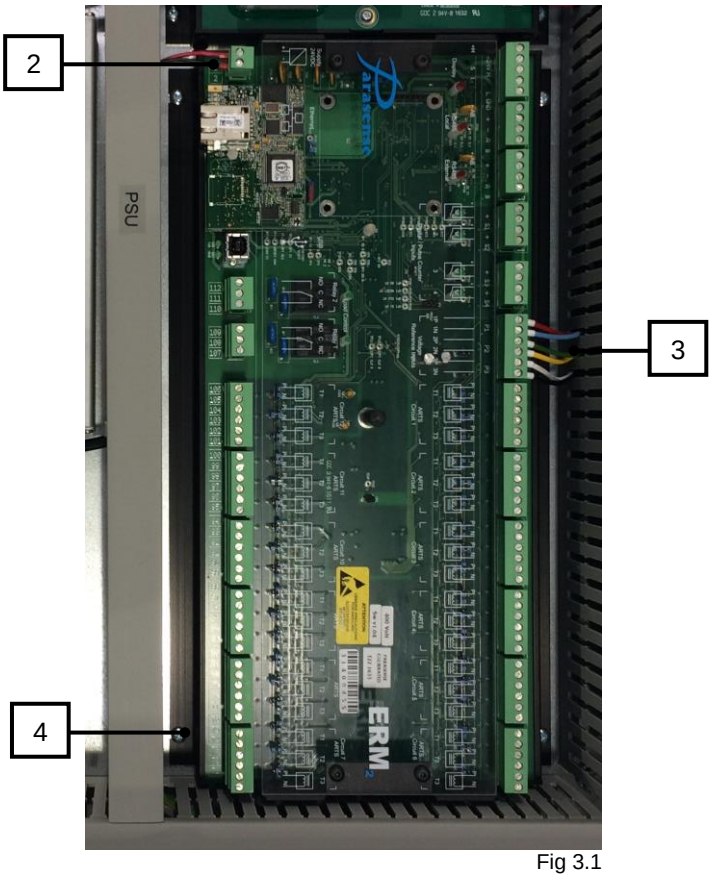


Fig 3.1

REPLACING THE VOLTAGE REFERENCE MODULE

Switch off the mains supply to the ERM2 and wait for a few seconds while the power supply discharges. Open the door with the key provided, switch off at the internal circuit breaker **(1)** (see Figure 4.0).

Fig 4.0

Disconnect the power input connections **(2)** and all output connections **(3)** (see Figure 4.1).

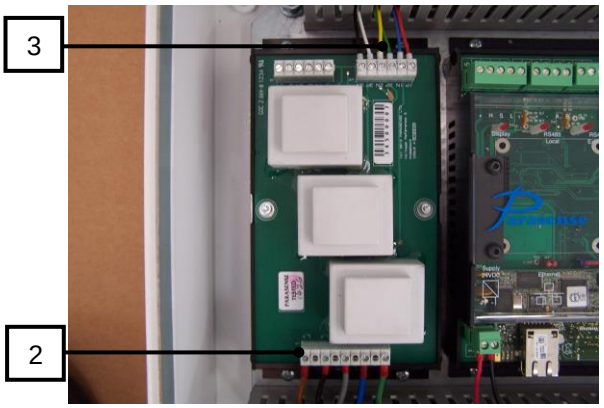


Fig 4.1

Unscrew the four screws **(4)** fixing the Voltage Reference Module to the mounting plate (see Figure 4.2). The module can now be removed from the enclosure.

To install the new Voltage Reference Module, mount the module with the four screws onto the base plate. Reconnect the output wiring and power input connections. Close the internal circuit breaker, lock the enclosure door and reinstate the mains supply.

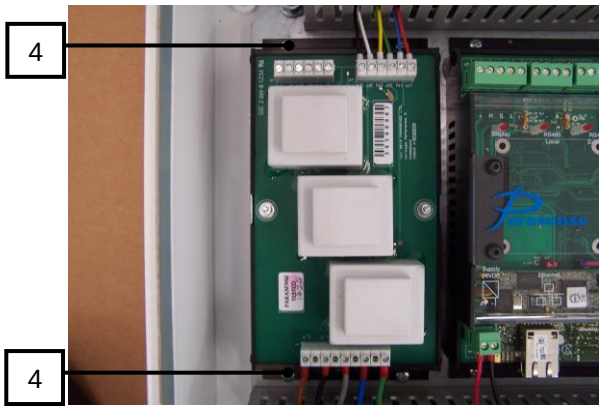


Fig 4.2

REPLACING THE POWER SUPPLY UNIT

Switch off the mains supply to the ERM2 and wait for a few seconds while the power supply discharges. Open the door with the key provided, switch off at the internal circuit breaker **(1)** (see Figure 5.0).

Fig 5.0

Noting the sequence - Disconnect the mains supply cables to the PSU **(2)** followed by the output cables to the Network module **(3)** (see Figure 5.1).

Fig 5.1

Unscrew the four screws that holds the PSU in place **(4)** (see Figure 5.2). The PSU can now be removed from the enclosure.

To install the new PSU, mount to the base plate with the four screws. Reconnect the wiring connections. Close the internal circuit breaker, lock the enclosure door and reinstate the mains supply.

Fig 5.2

REPLACING THE CIRCUIT BREAKER

Switch off the mains supply to the ERM2 and wait for a few seconds while the power supply discharges. Open the door with the key provided, switch off at the internal circuit breaker **(1)** (see Figure 6.0).

Fig 6.0

Noting the sequence - Disconnect the mains supply cables **(2)** followed by the output cables **(3)** (see Figure 6.1).

Slide the securing tab out that holds the circuit breaker in place **(4)** (see Figure 6.1). The circuit breaker can now be removed from the enclosure.

To install the new circuit breaker, clip onto the Din rail by sliding the securing tab out. Reconnect the output wiring, then the mains in connections. Close the internal circuit breaker, lock the enclosure door and reinstate the mains supply.

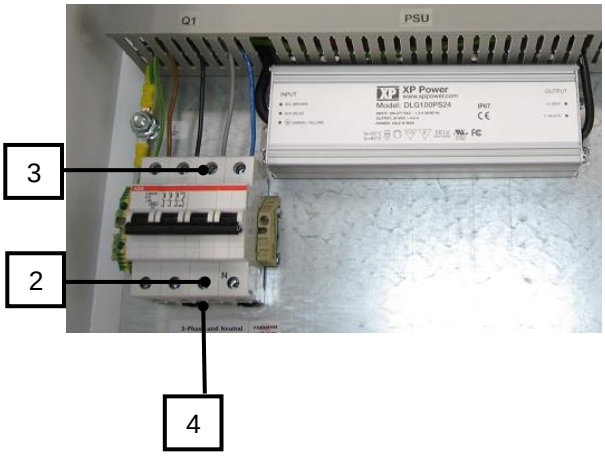


Fig 6.1

3 SPECIFICATION

Models ERM2-104-106/ERM2-104-106US, ERM2-104-112/ERM2-104-112US	
Power	120/208, 230/400, 277/480 VAC, 170VA, 50/60Hz Overvoltage Category III
Ethernet	WAN : 10 Base-T RJ45 Socket LAN : 10/100 Base-T RJ45 Sockets x 6 (-108/US) x 14 (-116/US)
USB	USB2.0, Type B Socket
Fault/Alarm Relay	Volt free, change-over Max switching voltage: 277V AC / 30V DC Max switching current: 6A AC / 5A DC (resistive)
Output Relays	Volt free, change-over Max switching voltage: 277V AC / 30V DC Max switching current: 6A AC / 5A DC (resistive)
Cluster Networks 1 and 2	RS485 communication Network power: 24V DC max 650mA Baud rate: 115 Kbps Number of cluster points dependent on application
Current Measurement SART's	Current range: (per phase) 2 to 2500A Secondary range: 0 to 150mA Open circuit protection provided Accuracy: better than 1% Revenue grade: complies with ANSI C12.1-2008 Measurement category III
Voltage Reference	120/208, 230/400, 277/480 three phase, 50/60Hz
Pulse Counters/Digital Inputs	Outputs (for use with volt-free contacts): Up to 24V DC, max 20 mA Input: 0-24V DC Max. pulse frequency: 1 kHz Min. pulse duration: 500 µs Logic '0' < 2V ; Logic '1' > 5V
Operating Conditions	Operating temperature: 0°C to 50°C (32°F to 123°F) Storage temperature: -23°C to 65°C (-9°F to 150°F) Relative Humidity: 20 to 95% RH (non-condensing) Pollution degree 2 Altitude up to 2000m (6560ft) Indoor Use Only
Overcurrent Protection	10A DP MCB
Enclosure Rating	IP54 / NEMA 12
Approvals	EN61010:2010 UL61010-1 CSA C22.2 61010-1

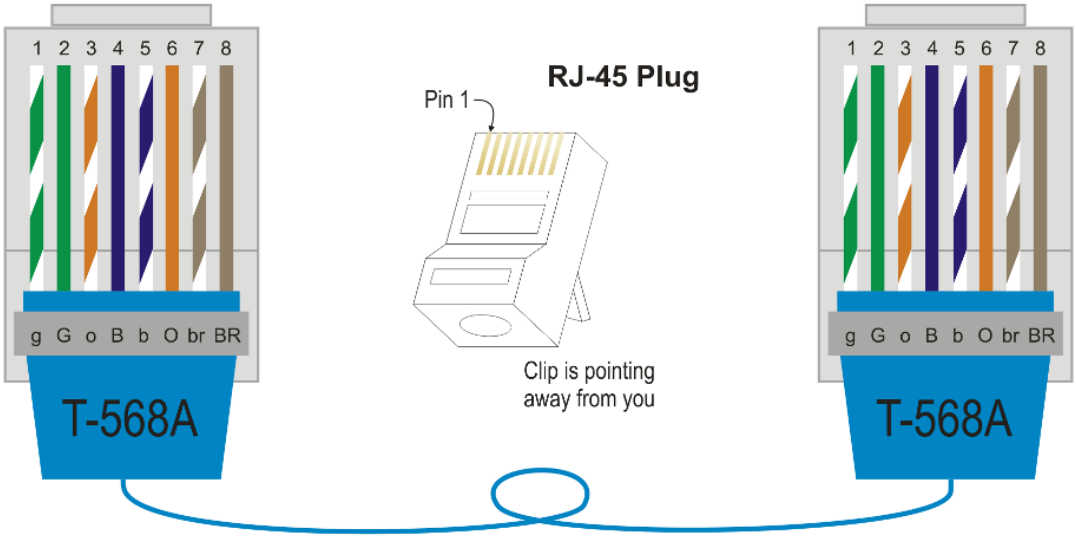
4 APPENDIX

ETHERNET CABLE DETAIL

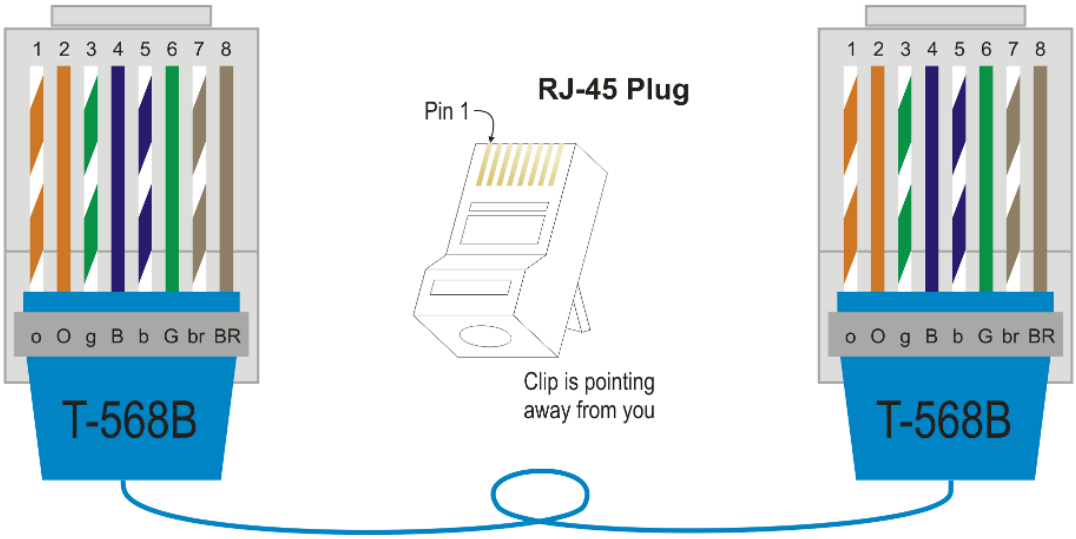
The information listed here is to assist Network Administrators in the colour coding of Ethernet cables. Please be aware that modifying Ethernet cables improperly may cause loss of network connectivity. Two wiring styles are available for straight-through connections.

The T-568A standard is supposed to be used in new network installations. Most off-the-shelf Ethernet cables are still of the T-568B standard. It makes no functional difference which you choose.

T-568A Straight-Through Ethernet Cable



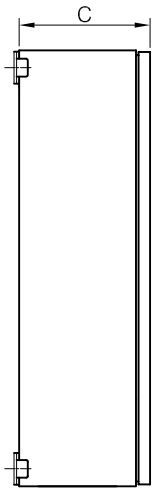
T-568B Straight-Through Ethernet Cable



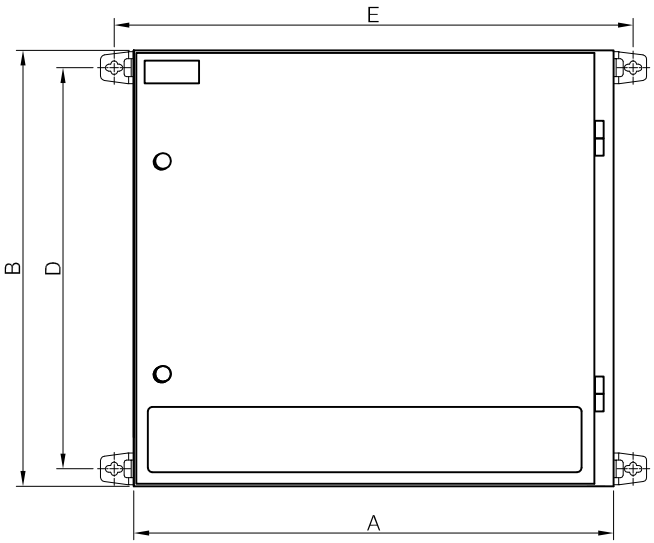
ERM2 PANEL MOUNTING DETAILS (PM1790)

ERM$_2$

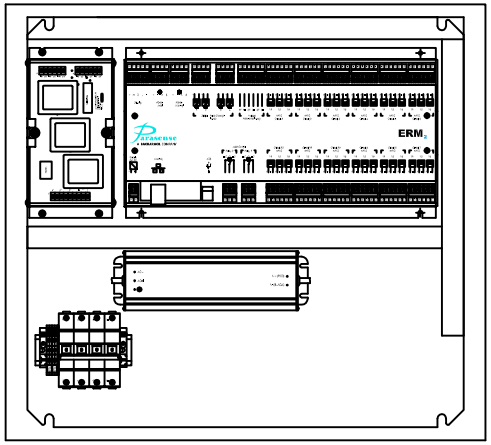
SIDE VIEW



EXTERNAL VIEW



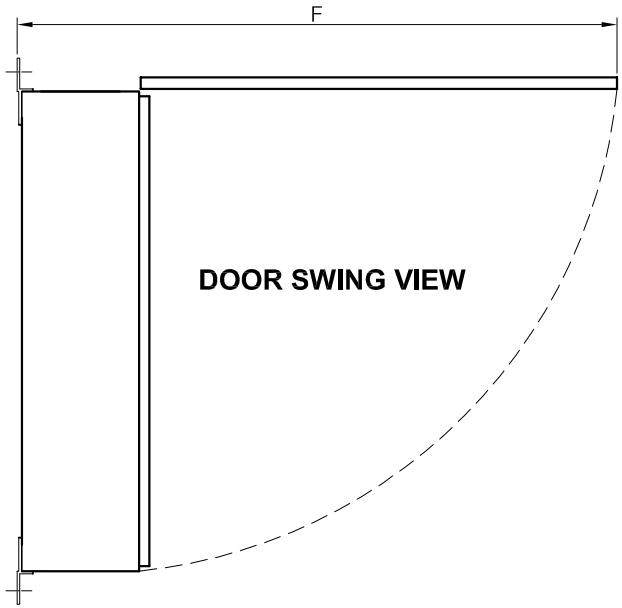
INTERNAL VIEW



DIMENSIONS

MODEL - ERM$_2$	A	B	C	D	E	F	WEIGHT
Metric (mm)	550	500	150	460	595	640	20kg
Imperial (inches)	21.7	19.7	5.9	18.1	23.4	25.2	44lb

1. The ERM2 is housed in an IP54 / NEMA 12 rated enclosure. It must be mounted to a solid vertical surface or structure capable of supporting the stated weight. We recommend the surface be built from concrete blocks of brick. It must be positioned where the door can be fully opened, and in a location that facilitates easy service and maintenance. The top of the enclosure should not be fitted higher than 1.8m (6ft) above floor level
2. Four fixing brackets are supplied loose with the monitor. They can be fitted vertically or horizontally. Choose the appropriate orientation, insert the bolt and nylon washer through the enclosure from the inside and tighten the bolts into the mounting brackets.
3. Fixings should be 4mm (1/8") or 5mm (3/16") screws or bolts minimum 40mm (1.5") long with plain washers suitable for wall plugs.
4. The enclosure is designed for cable entry from below. It has pre-drilled knock-outs for cabling. Ensure the mains cable uses the knock-out in the left end of the enclosure directly below the circuit breaker. If access is required from the sire or above then the fitting must be of such a type to prevent ingress of moisture or dust. Failure to do so could invalidate the warranty
5. Ensure the panel is mounted where the environmental conditions are within; Temperature 0°C/+32°F to +50°C/+123°F. Humidity: 20% to 95%, non-condensing



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Doc. Ref: H105-4 09/03/18

title:
ERM2-104-112
Panel Mounting Details

drawn: James Wilkinson
date: 12th Aug 2010
part number: .....

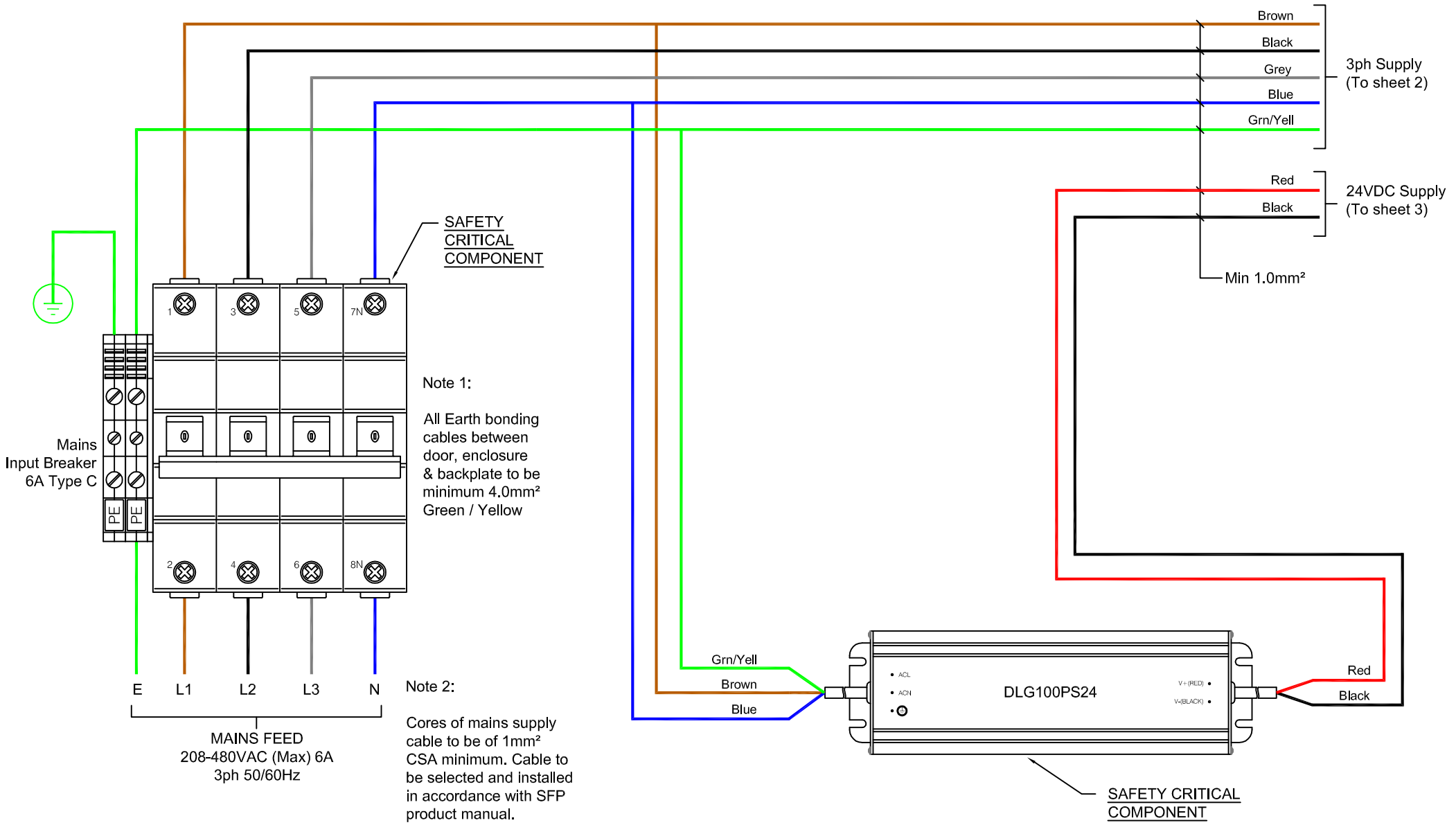
drawing number:
PM1790

revision: **7**
sheet: **1 of 1**

revision:	checked:
5. Drawing border updated. JW 13th May 2016	AK
6. Drawing border updated. Stepwise branding removed. JW 21st February 2017	AK
7. Drawing border updated. Parasense logo updated. JW 22nd March 2018	JB

ERM2 WIRING SCHEMATICS (PS0735)

ERM2



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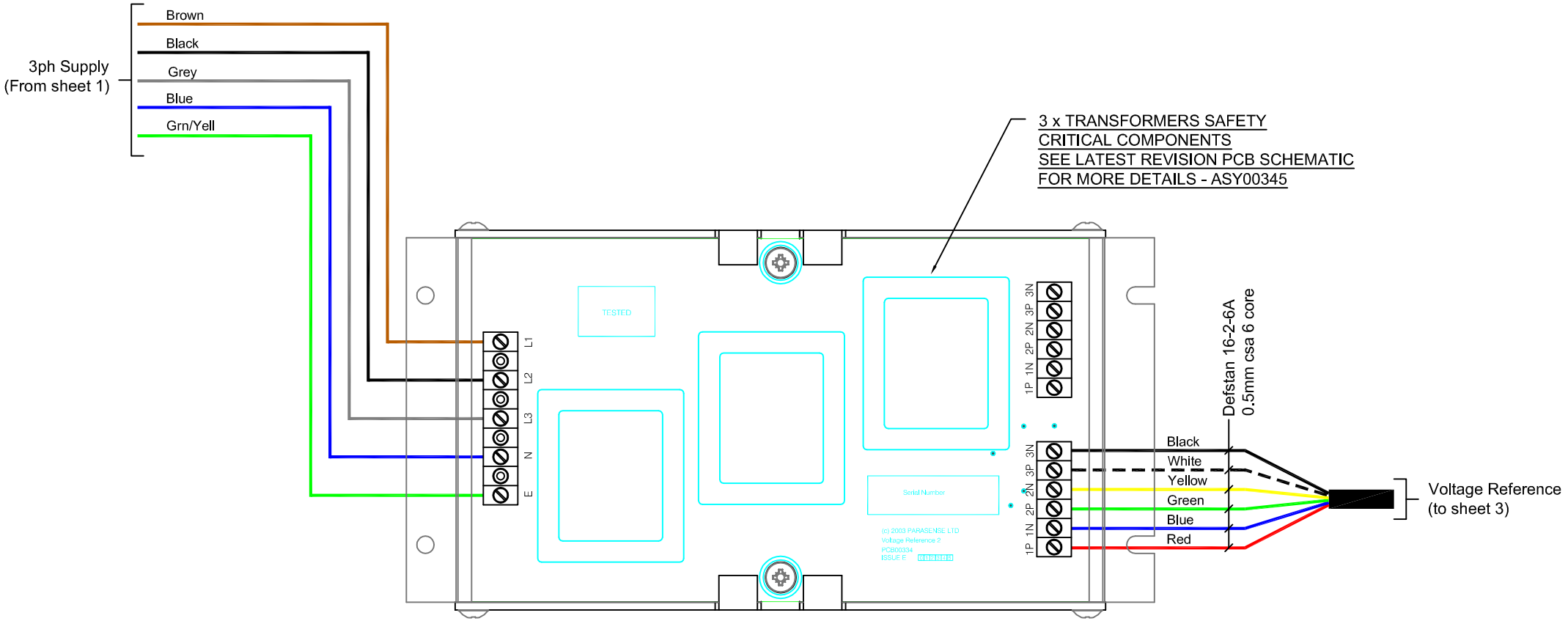
Doc. Ref: H105-4 09/03/18

title: ERM2-104-106US/112US Controls Schematic			
drawn: ANK	date: 16th Nov 2012	part number:	
drawing number: **PS0735**			
revision: **7**	sheet: **1 of 3**		

revision:	checked:
5. Drawing border updated. JW 13th May 2016	AK
6. Drawing border updated. Stepwise branding removed. JW 21st February 2017	AK
7. Drawing border updated. JW 22nd March 2018	JB

ERM2



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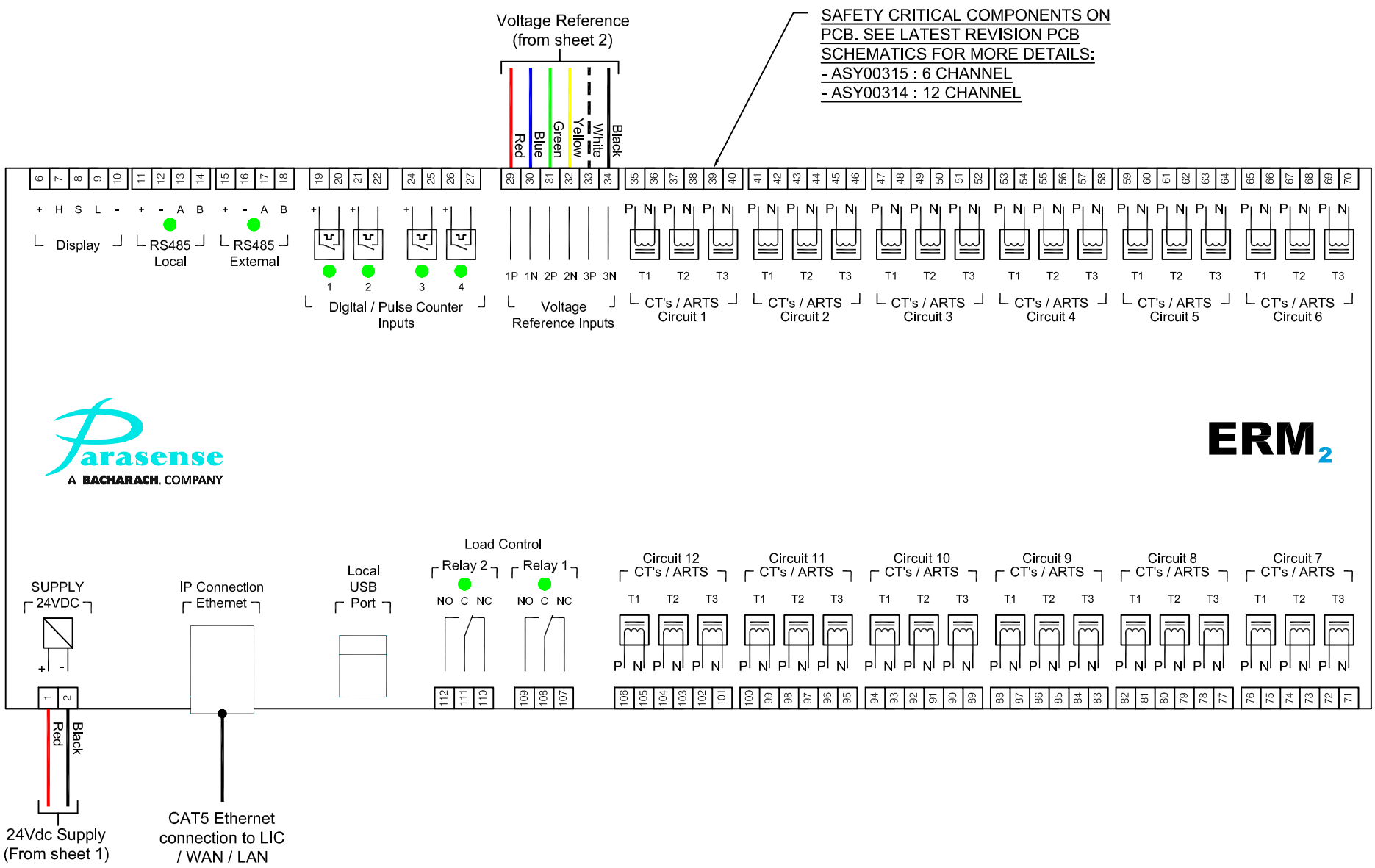
Doc. Ref: H105-4 09/03/18

title: ERM2-104-106US/112US Controls Schematic			drawing number: **PS0735**
drawn: ANK	date: 16th Nov 2012	part number:	revision: **7** / sheet: **2 of 3**

revision:	checked:
5. Drawing border updated. JW 13th May 2016	AK
6. Drawing border updated. Stepwise branding removed. JW 21st February 2017	AK
7. Drawing border updated. JW 22nd March 2018	JB

ERM2



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Doc. Ref: H105-4 09/03/18

title:
ERM2-104-106US/112US
Controls Schematic

drawn: ANK

date: 16th Nov 2012

part number: .....

drawing number:
PS0735

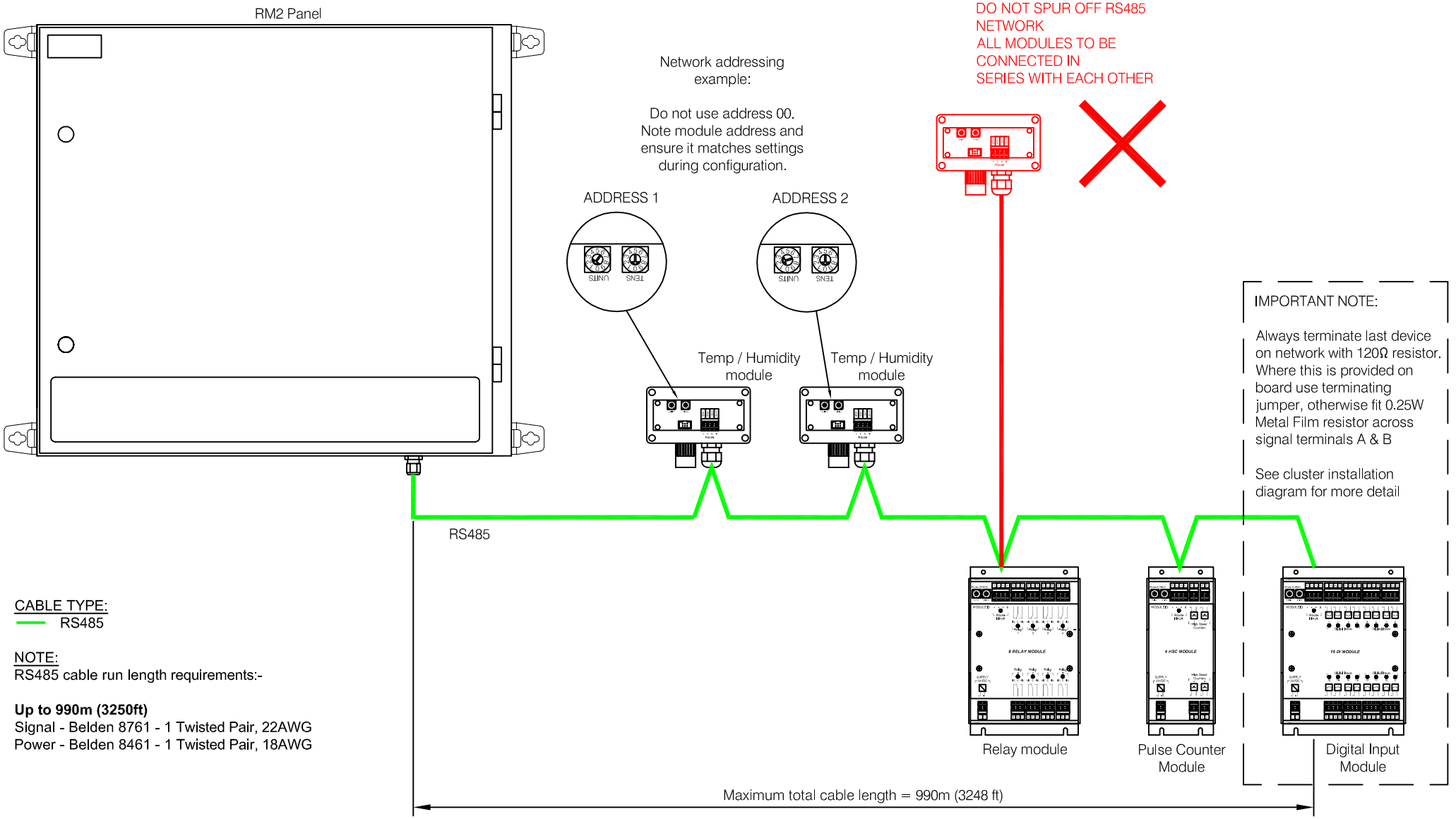
revision: **7**

sheet: **3 of 3**

revision:	checked:
5. Drawing border updated. JW 13th May 2016	AK
6. Drawing border updated. Stepwise branding removed. JW 21st February 2017	AK
7. Drawing border updated. JW 22nd March 2018	JB

CLUSTER NETWORK CONNECTIONS (PS0663)

RM2



CABLE TYPE:
RS485

NOTE:
RS485 cable run length requirements:-

Up to 990m (3250ft)
Signal - Belden 8761 - 1 Twisted Pair, 22AWG
Power - Belden 8461 - 1 Twisted Pair, 18AWG

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Doc. Ref: H105-4 09/03/18

title:	drawing number:	revision:	sheet:
RS485 to RM2 Cluster Cabling Rules	**PS0663**	**8**	**1 of 1**

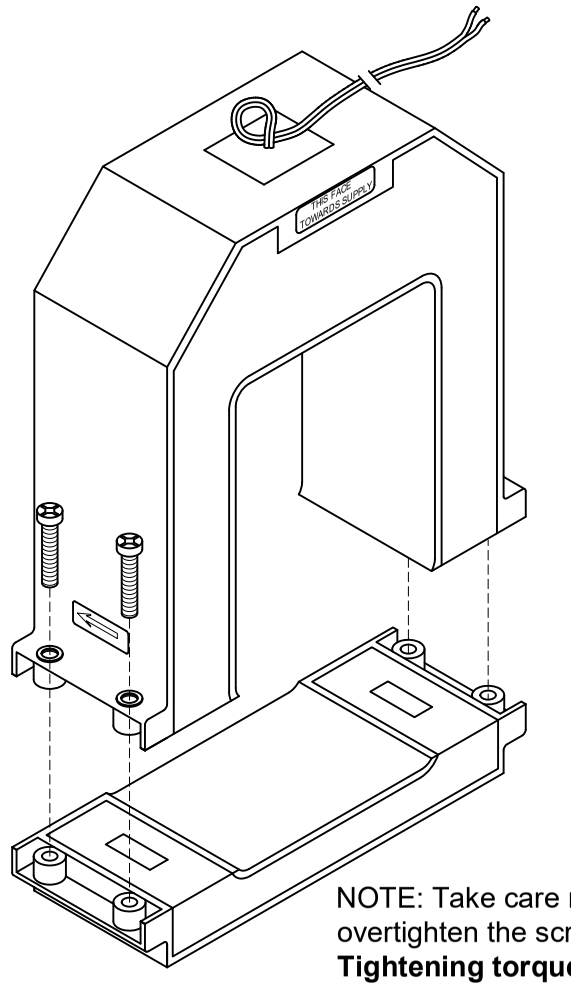
drawn:	date:	part number:
David Seal	25th Feb 2010	.....

revision:	checked:
6. Drawing border updated. JW 4th Feb 2016	AK
7. Drawing border updated. JW 21st Feb 2017	AK
8. Drawing border updated. JW 21st Feb 2017	AK

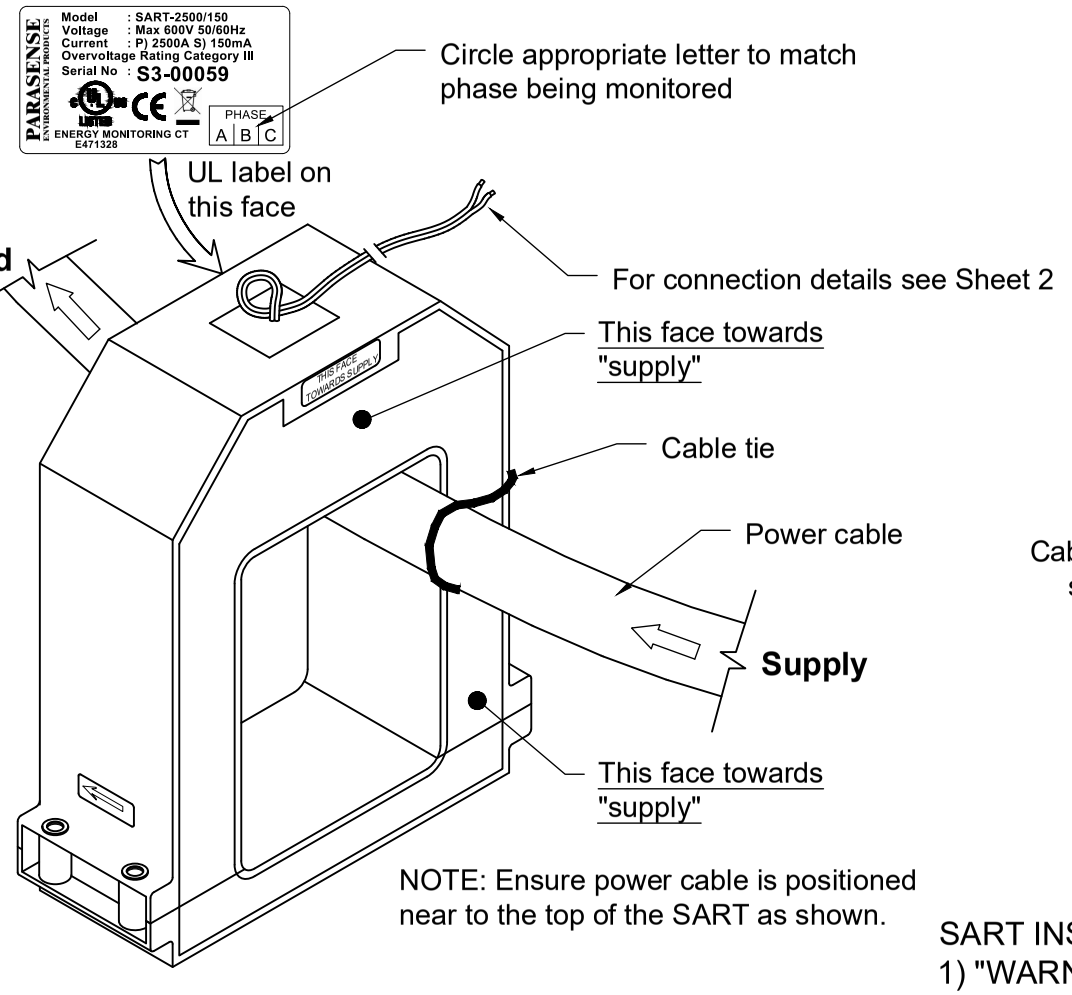
SPLIT ARTS INSTALLATION GUIDELINES (PM2163)

Split ARTs

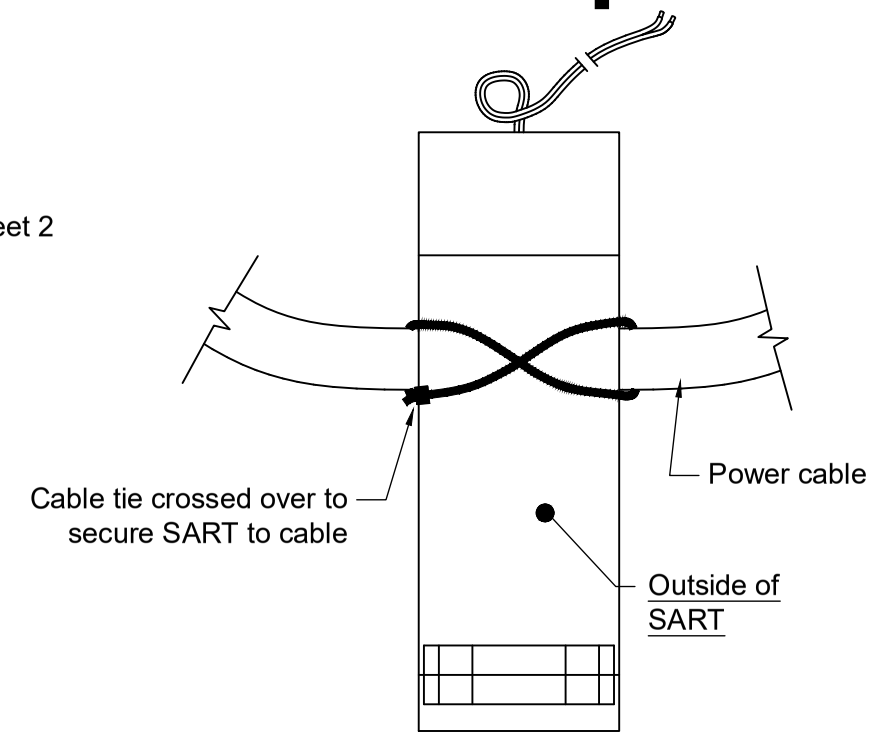
2000 & 2500 Amp SART



NOTE: Take care not to overtighten the screws.
Tightening torque:
1.1 lb.ft (1.5Nm)



NOTE: Ensure power cable is positioned near to the top of the SART as shown.

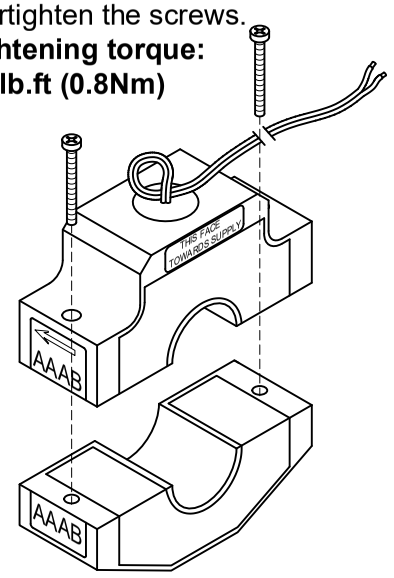


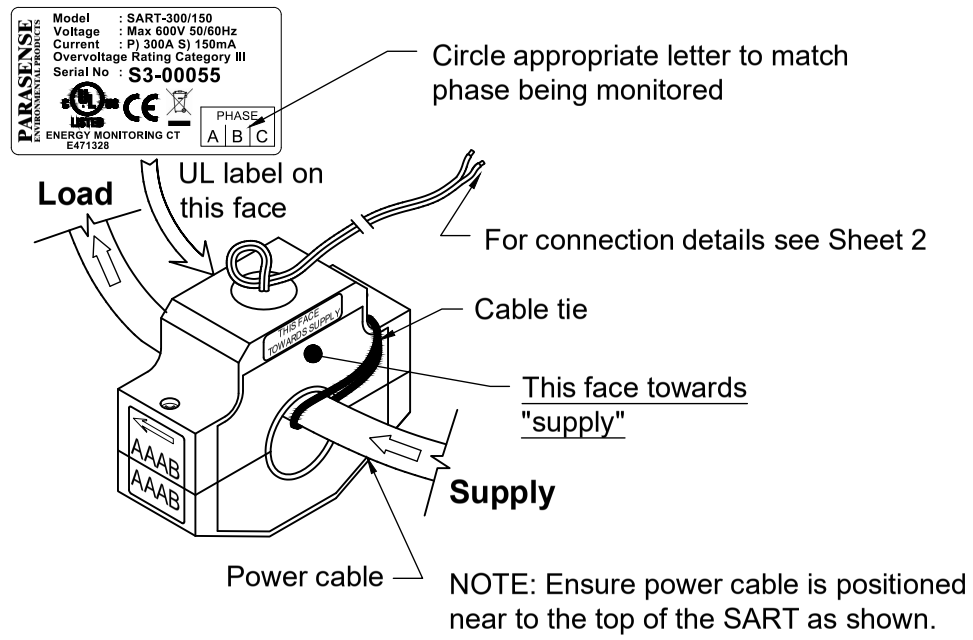
Generic Cable Tie Detail

SART INSTALLATION AND POSITIONING NOTES:
1) "WARNING" To reduce the risk of electric shock, always open or disconnect circuit from power distribution system (or service) of building before installing or servicing the SARTs
2) Position and secure SARTs as shown. **The cable should be as close to the top of the SART as possible to ensure maximum accuracy.**
3) The SARTs may not be installed in equipment where they exceed 75% of the wiring space of any cross-sectional area within the equipment
4) Restrict installation of the SARTs in an area where it would block ventilation openings
5) Restrict installation of SARTs in area of breaker arc venting
6) SARTS not suitable for Class 2 wiring methods
7) Not intended for connection to Class 2 equipment
8) Secure SARTs and route conductors so that they do not directly contact live terminals or bus bars
10) Ensure SARTs are installed where the environmental conditions are between 32°F to 110°F (0°C to 43°C) and 0 to 95% relative humidity, non-condensing

300, 600 & 1200 Amp SART

NOTE: Take care not to overtighten the screws.
Tightening torque:
0.6 lb.ft (0.8Nm)





NOTE: Ensure power cable is positioned near to the top of the SART as shown.

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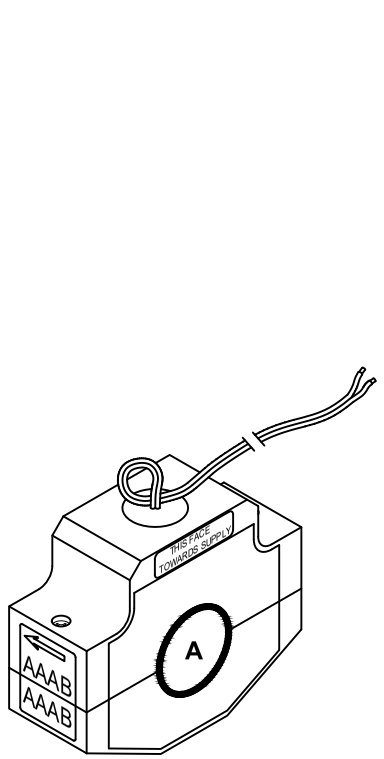
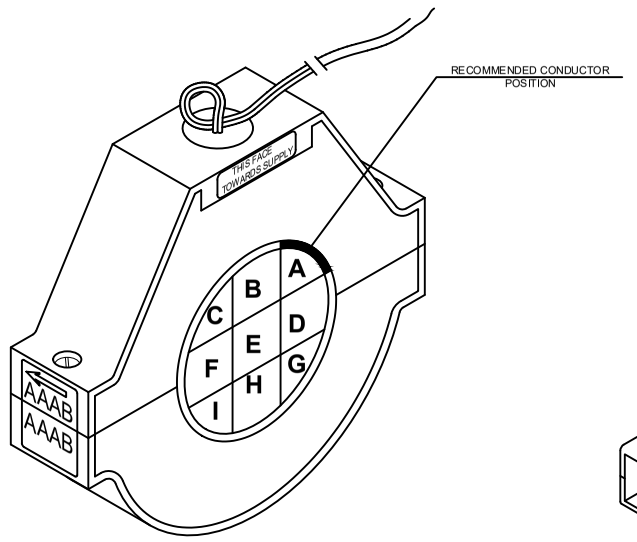
Doc. Ref: H105-5 10/05/18

title: Split ARTs Installation Guidelines	drawing number: **PM2163**	
	revision: **11**	sheet: **1 of 3**
drawn: James Wilkinson	date: 1st Sept 2014	part number: .....

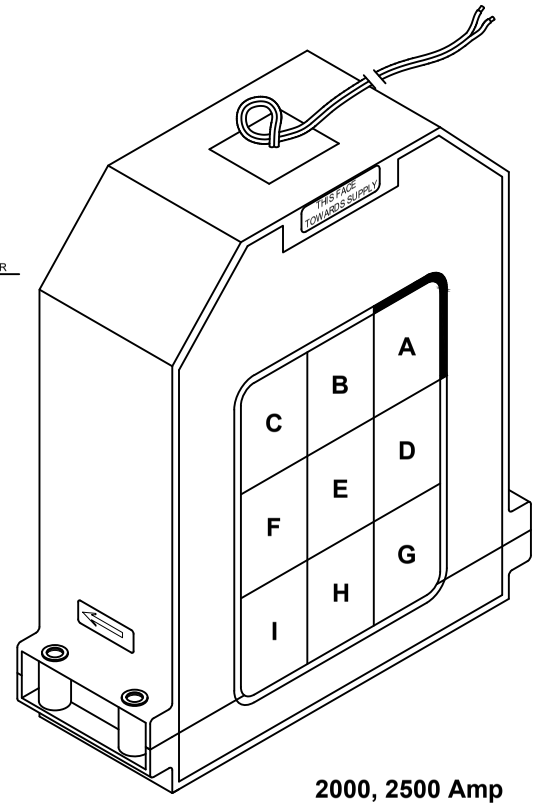
revision:	checked:
9. Drawing border updated. JW 22nd March 2018	JB
10. 300,600, 1200A torque settings changed. JW 23rd April 2018	JB
11. Border updated. Revised sheet 1 pictorially, sht 3 was sht 2, added sht 2. JH 20th Nov 2018	PJ



300 Amp



600, 1200 Amp



2000, 2500 Amp

SART SIZE(AMPS) \ ZONE	A	B	C	D	E	F	G	H	I
300	+0.0 -0.0	+0.0 -0.0	+0.0 -0.0	+0.0 -0.0	+0.0 -0.0	+0.0 -0.0	+0.0 -0.0	+0.0 -0.0	+0.0 -0.0
600	+0.0 -0.0	+1.4 -0.0	+1.3 -0.1	+0.3 -0.0	+0.3 -0.0	+0.3 -0.0	+0.1 -0.8	+0.1 -1.4	+0.8 -0.3
1200	+0.0 -0.0	+0.8 -0.0	+0.9 -0.5	+0.0 -0.3	+0.6 -0.2	+0.4 -0.6	+0.5 -0.1	+1.0 -0.0	+0.8 -0.2
2000	+0.0 -0.0	+0.0 -1.9	+1.2 -0.2	+0.0 -5.8	+0.0 -6.0	+0.0 -9.1	+0.0 -14.5	+0.0 -14.1	+0.0 -15.5
2500	+0.0 -0.0	+0.7 -0.0	+0.2 -0.7	+0.0 -8.7	+0.0 -11.3	+0.0 -13.1	+0.0 -19.1	+0.0 -20.0	+0.0 -21.5

TYPICAL ADDITIONAL ERROR BASED ON CONDUCTOR POSITION

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title: Split ARTs Installation Guidelines

drawn: James Wilkinson | date: 1st Sept 2014 | part number: .....

drawing number: **PM2163**

revision: **11** | sheet: **2 of 3**

revision:	checked:
9. Drawing border updated. JW 22nd March 2018	JB
10. 300,600, 1200A torque settings changed. JW 23rd April 2018	JB
11. Border updated. Revised sheet 1 pictorially, sht 3 was sht 2, added sht 2. JH 20th Nov 2018	PJ

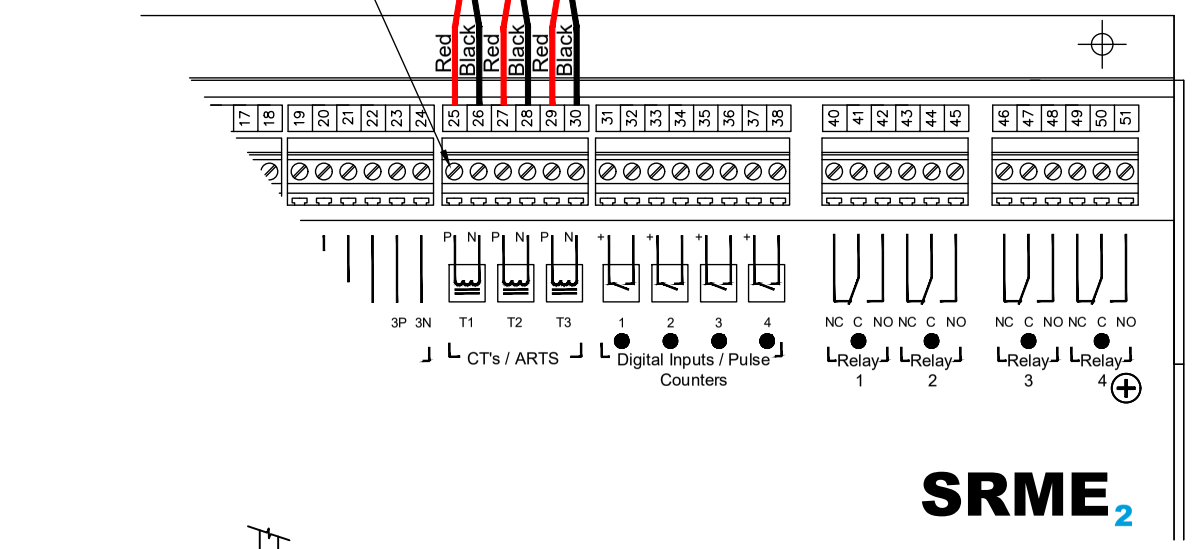
Split ARTs

Max cable length from PCB terminals to SARTs -1000ft (305M)

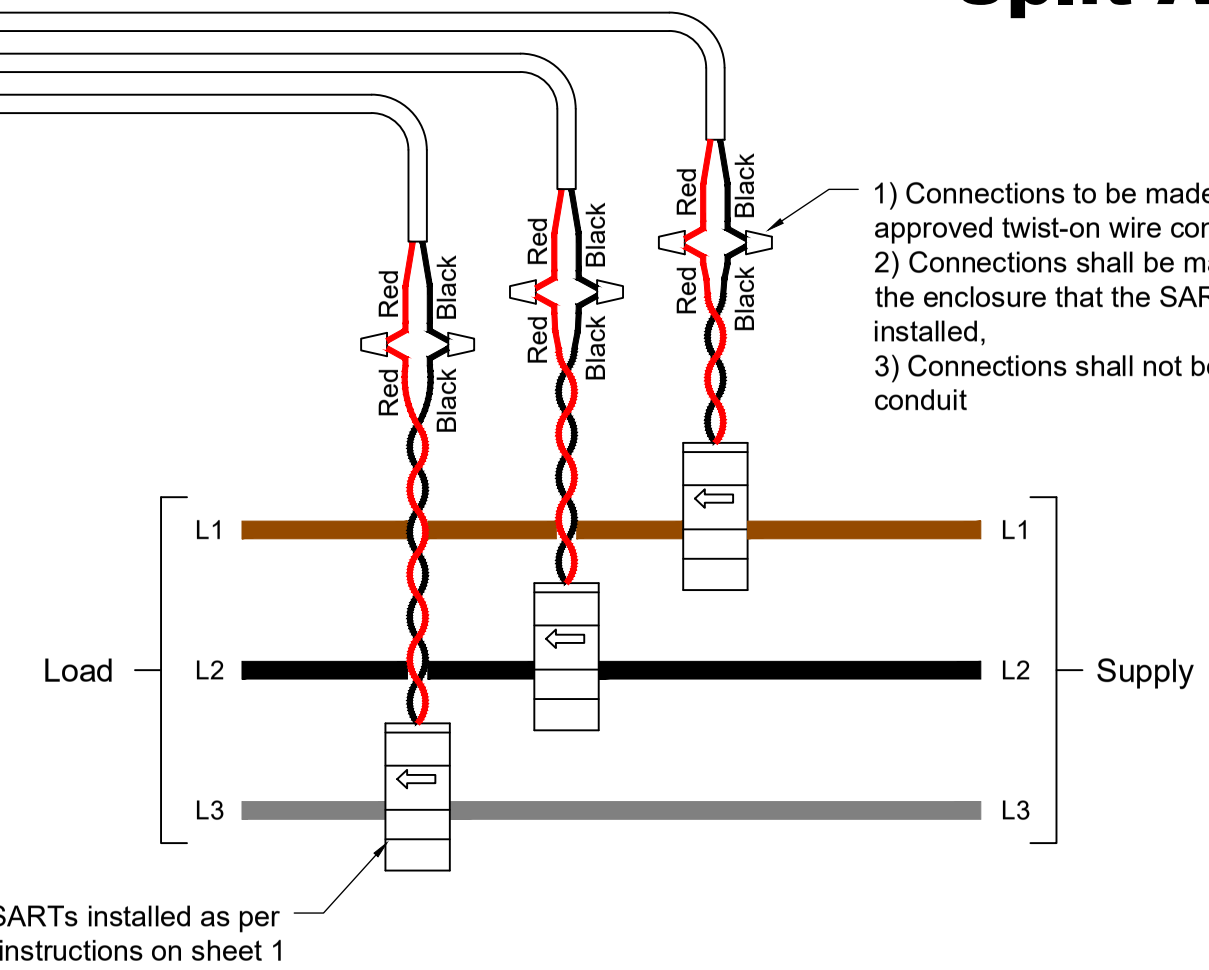
Tightening torque
Min 0.37 lb.ft (0.5Nm)
Max 0.44 lb.ft (0.6Nm)

SUITABLE CABLE TYPES
Belden 9486
Belden 1064A
Nexans 631283

SRME2/SFP Connections



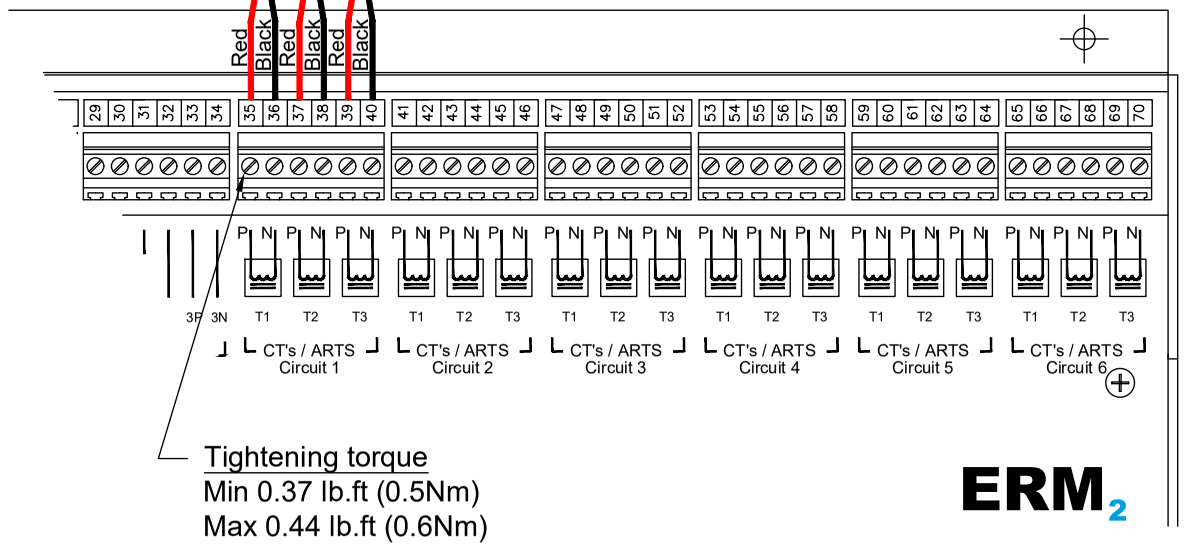
SRME2



1) Connections to be made using UL approved twist-on wire connectors
2) Connections shall be made within the enclosure that the SARTs are installed,
3) Connections shall not be inside conduit

SARTs installed as per instructions on sheet 1

ERM2 Connections



Tightening torque
Min 0.37 lb.ft (0.5Nm)
Max 0.44 lb.ft (0.6Nm)

ERM2

SART CABLING INSTALLATION GUIDELINES:

1) Position and install SARTs as shown on sheet 1 of this drawing - PM2163
2) Run a Belden 9486, 1064A or Nexans 631283 from the SFP/ERM2 to the panel/enclosure where the SARTs are installed. Label both ends with cable identification tags.
3) All wiring to be installed in EMT conduit as required by NEC, State and Location requirements and Clients best practice specifications
4) All conduit connections to Parasense equipment shall be water-tight and enter into the base of the monitor.
5) Connections to the SART flying lead tails shall be made using UL approved twist-on wire connectors
6) Connections shall be made within the enclosure that the SARTs are installed

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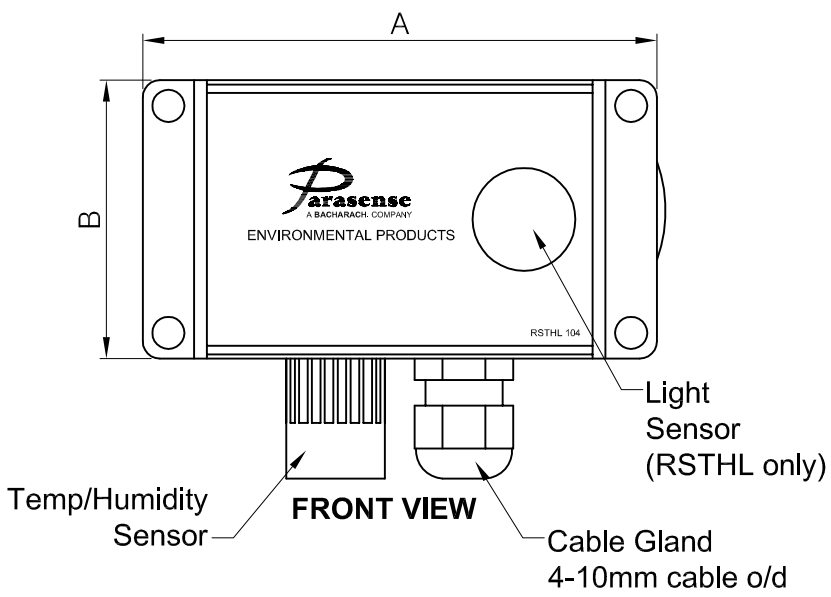
Doc. Ref: H105-5 10/05/18

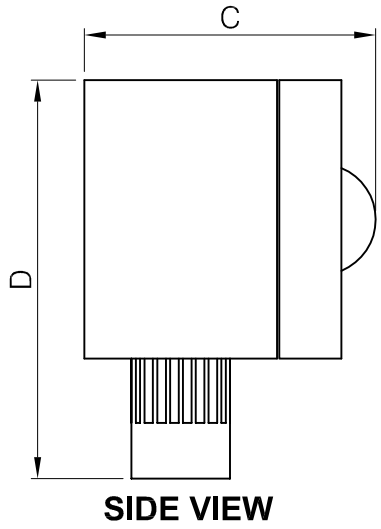
title: Split ARTs Installation Guidelines			
drawn: James Wilkinson	date: 1st Sept 2014	part number:	
drawing number: **PM2163**			
revision: **11**	sheet: **3 of 3**		

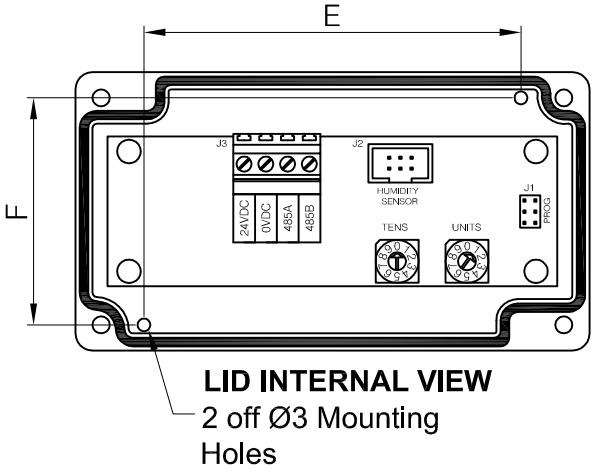
revision:	checked:
9. Drawing border updated. JW 22nd March 2018	JB
10. 300,600, 1200A torque settings changed. JW 23rd April 2018	JB
11. Border updated. Revised sheet 1 pictorially, sht 3 was sht 2, added sht 2. JH 20th Nov 2018	PJ

RSTHL-104 PANEL MOUNTING DETAILS (PM1791)

RM2

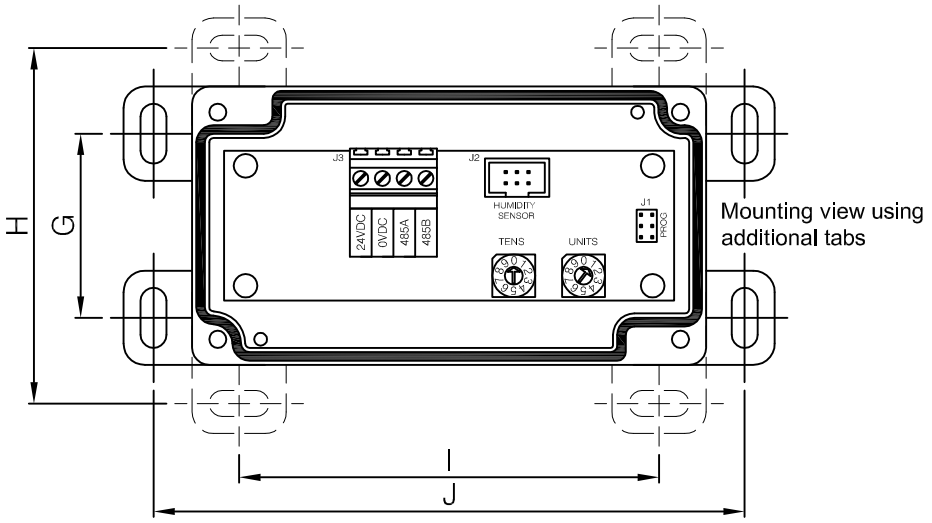






DIMENSIONS

MODEL - RSTH(L)	A	B	C	D	E	F	G	H	I	J	WEIGHT
Metric (mm)	120	65	68	93	88	53	43	83	98	138	200g
Imperial (inches)	4.7	2.6	2.7	3.7	3.5	2.1	1.7	3.3	3.9	5.5	0.5lb



MOUNTING INSTRUCTIONS

1. The RSTHL is housed in an IP65 / NEMA 4X rated enclosure. It must be mounted to a solid vertical surface or structure capable of supporting the stated weight. It must be positioned where the enclosure lid can be fully opened, and in a location that facilitates easy service and maintenance.

2. The enclosure is mounted using screws and mounting holes as shown in the 'Internal View' above. Alternatively, the enclosure is provided with additional mounting tabs that can be used, as shown to the right.

3. Ensure the enclosure is mounted where the environmental conditions are within; Temperature: -30°C/-22°F to +55°C/+131°F. Humidity: 0% to 100%, Non-condensing.

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Doc. Ref: H105-4 09/03/18

title: RSTHL-104 Internal Environmental Sensor Mounting Details			
drawn: Scott Brindley	date: 16th Aug 2010	part number: RSTHL-104	

drawing number: **PM1791**

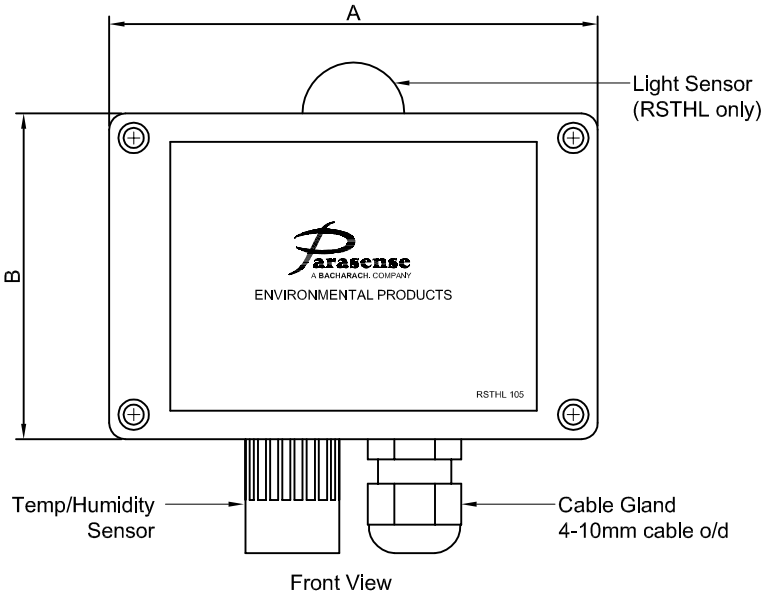
revision: **7**

sheet: **1 of 1**

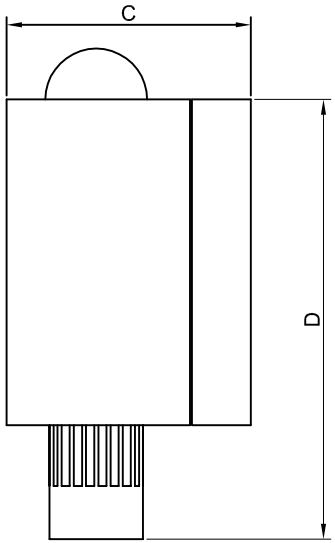
revision:	checked:
5. Drawing border updated. JW 1st November 2016	AK
6. Drawing border updated. JW 16th January 2017	AK
7. Drawing border updated. JW 22nd March 2018	JB

RSTHL-105 PANEL MOUNTING DETAILS (PM1898)

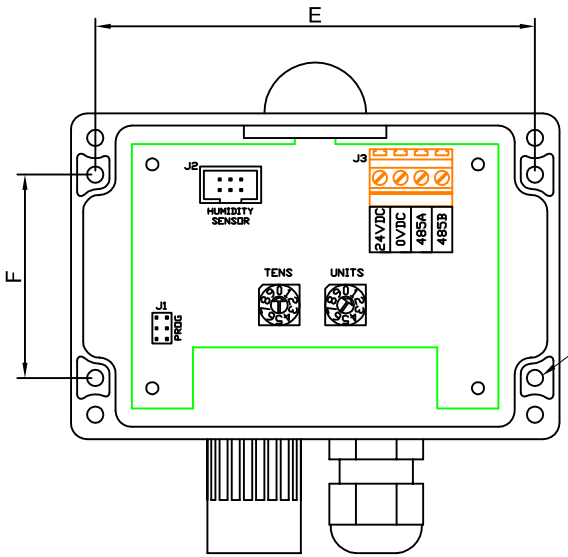
RM2



Front View



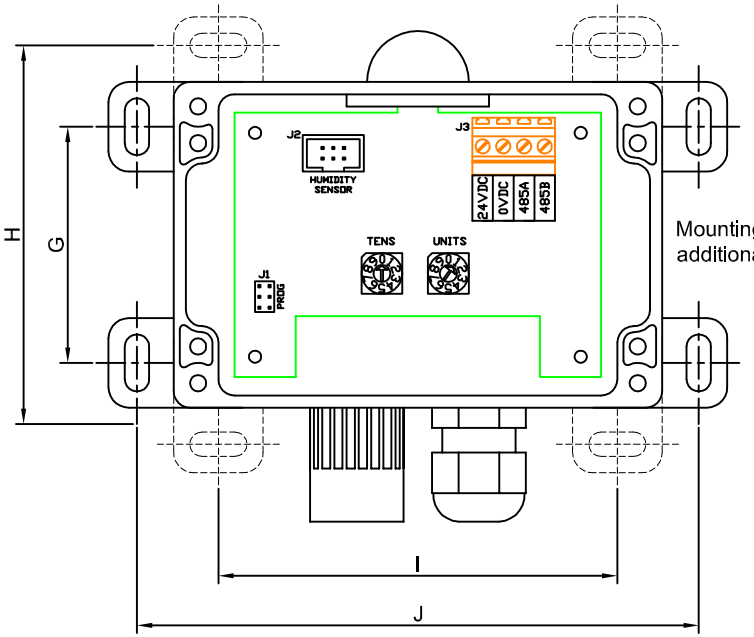
Side View



Internal View

DIMENSIONS

MODEL - RSTH(L)	A	B	C	D	E	F	G	H	I	J	WEIGHT
Metric (mm)	120	80	60	108	108	50	58	98	98	138	200g
Imperial (inches)	4.7	3.2	2.4	4.3	4.3	2	2.3	3.9	3.9	5.4	0.5lb



IMPORTANT LOCATION INSTRUCTIONS

In order to avoid inaccurate temperature and humidity readings it is essential that the RSTHL external sensors are installed in a location that is:

1. Shaded from the sun all day, preferably on a north-facing wall
2. Well ventilated to avoid heat build up
3. Away from potential heat sources such as condensers, ventilation ducts, AHUs etc.
4. Away from reflective surfaces
5. At least 2m (6ft) above the surface

GENERAL MOUNTING INSTRUCTIONS

1. The RSTHL is housed in an IP65 / NEMA 4X rated enclosure. It must be mounted to a solid vertical surface or structure capable of supporting the stated weight. It must be positioned where the enclosure lid can be fully opened, and in a location that facilitates easy service and maintenance.

2. The enclosure is mounted using screws and mounting holes as shown in the 'Internal View' above. Alternatively, the enclosure is provided with additional mounting tabs that can be used, as shown to the right.

3. Ensure the enclosure is mounted where the environmental conditions are within; Temperature: -30°C/-22°F to +155°C/+131°F. Humidity: 0% to 100%, Non-condensing.

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Doc. Ref: H105-4 09/03/18

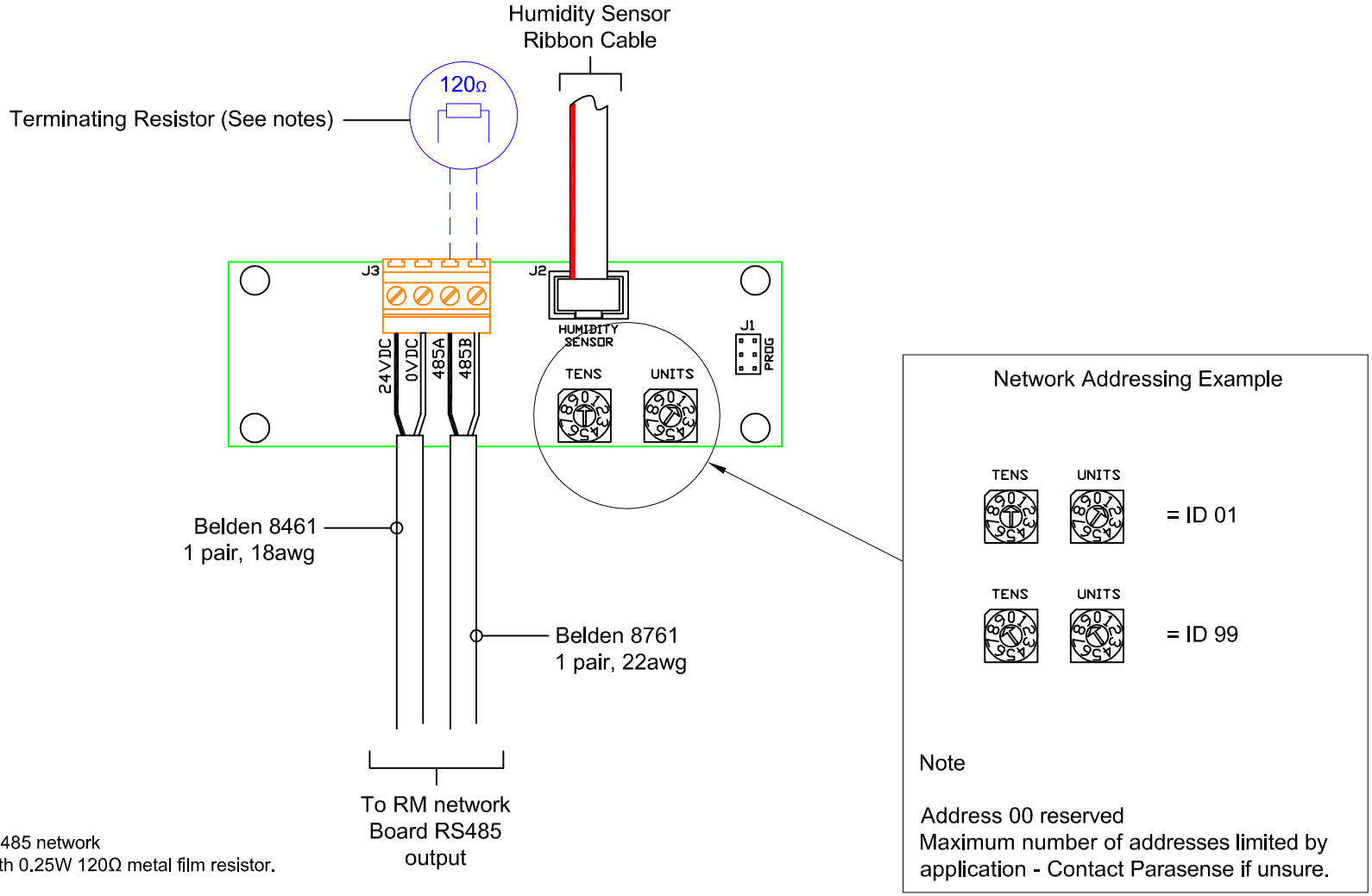
title:	drawing number:	revision:	sheet:
RSTHL-105 External Environmental Sensor Mounting Details	PM1898	7	1 of 1

drawn:	date:	part number:
Scott Brindley	25th Aug 2011	RSTHL-105

revision:	checked:
5. Drawing border updated. JW 1st November 2016	AK
6. Drawing border updated. JW 16th January 2017	AK
7. Drawing border updated. JW 22nd March 2018	JB

RSTHL-104 CONNECTION DETAILS (PS0639)

RM2



Note:-

1: Each device to have unique address on RS485 network
2: Last device on network to be terminated with 0.25W 120Ω metal film resistor.
3: RS485 Cable spec dependent on length:-

Up to 990m (3250ft)
Signal - Belden 8761 - 1 Twisted Pair, 22AWG
Power - Belden 8461 - 1 Twisted Pair, 18AWG

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Doc. Ref: H105-4 09/03/18

title:	drawing number:	revision:	sheet:
RSTHL-104 Connection Details	**PS0639**	**9**	**1 of 1**

drawn:	date:	part number:
David Seal	20th July 2010	RSTHL-104

revision:	checked:
7. Drawing border updated. JW 1st November 2016	AK
8. Drawing border updated. JW 16th January 2017	AK
9. Drawing border updated. JW 22nd March 2018	JB

RSTHL-105 CONNECTION DETAILS (PS0693)

RM2

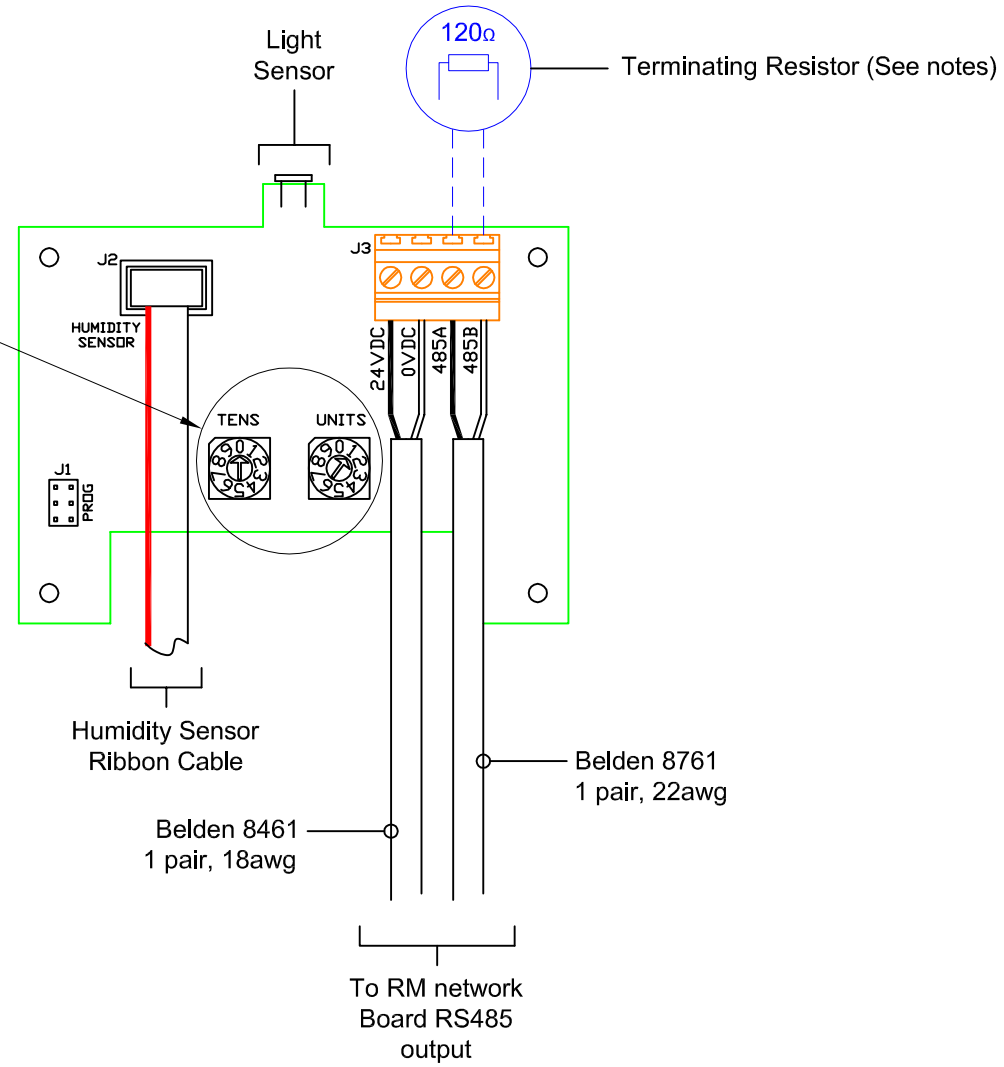
Network Addressing Example

TENS UNITS = ID 01

TENS UNITS = ID 99

Note

Address 00 reserved
Maximum number of addresses limited by application - Contact Parasense if unsure.



Note:-

1: Each device to have unique address on RS485 network
2: Last device on network to be terminated with 0.25W 120Ω metal film resistor.
3: RS485 Cable spec dependent on length:-

Up to 990m (3250ft)
Signal - Belden 8761 - 1 Twisted Pair, 22AWG
Power - Belden 8461 - 1 Twisted Pair, 18AWG

Parasense
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title: RSTHL-105 Connection Details

drawing number: **PS0693**

drawn:	date:	part number:	revision:	sheet:
Scott Brindley	25th Aug 2011	RSTHL-105	9	1 of 1

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