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EPT/ANS/A052

Issue 8, 21-Aug-2020
Use until 21-Aug-2021

Published by Technical Documentation - Openreach

Privacy- None

FTTC Power Operations & Maintenance (AC Power)

*This document must be read in conjunction with
EPT/ANS/A048 and EPT/ANS/A036*

About this document ...

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Content approval

This is the Issue 8 of this document.

The information contained in this document was approved on 21-Aug-2020
by John Hewitt, Senior Manager, Operations & Fibre

Version History

Version No.	Date	Author	Comments
Issue 8	21-Aug-2020	Desmond Silvera	Section 9 added H100A cabinet with new MA5818 Power cord
Issue 7	01-Jan-2019	Desmond Silvera	RCD 6 monthly routine changed
Issue 6	11-Dec-2018	Desmond Silvera	Reinstatement, review date extended
Issue 6	24-May-2017	Desmond Silvera	Reinstated with new author and approver contact
Issue 5	24-May-2016	Ian Cahill	General Updates
Issue 4	09-Mar-2016	Chief Engineer's Office Technical Documentation Team	Approver change
Issue 3	06-Feb-2016	Chief Engineer's Office Technical Documentation Team	Updates to section 5
Issue 2	20-Jan-2016	Chief Engineer's Office Technical Documentation Team	Correction - approver contact
Issue 2	06-Jan-2016	Chief Engineer's Office Technical Documentation Team	Approver update
Issue 1	03-Mar-2015	Document Manager T	Document migrated onto new platform with no content change
Issue 1	21-May-2012	Chief Engineer's Office Technical Documentation Team	First issue
Issue Draft 0a	18-May-2012		New document to cover AC power only routines on FTTC

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1 *Summary*

The purpose of this document is to describe the processes and procedures associated with all street based power activities (e.g. FTTC) in the operation of NGA by Openreach Power Engineers or approved Contractors. This document covers AC power and earthing maintenance. It should be read in conjunction with ISIS EPT/ANS/A048 which covers the DC power aspects and EPT/ANS/A036 which covers installation and certification.

Tasks will require the engineer to be trained and competent in various aspects of electrical power, including certification and inspection.

Warning: Only engineers that have been trained to work with both AC and DC power, e.g. accredited to the current edition of BS 7671 regulations, BT DC power systems and adhere to health and safety regulations at all times should perform the annual and 5 year inspection and testing.

Warning: These cabinets contain dual voltage power supplies (230V ac and 50V dc). DO NOT proceed with any task that you have not been trained to do so. Only access areas that you have been trained to work on.

2 *Scope*

The document is relevant to people in the following units:-

- AOC Controls
- Openreach Power Engineering Team
- NGA In-Life Engineering Team
- Work Manager data-builders

This document is **not** for engineers who are only DC power trained

3 *Introduction*

This document should be read in conjunction with EPT/ANS/A048, EPT/ANS/A036 and EPT/ANS/A051

This document describes the AC power and earthing routines necessary for continued safety of FTTC installations.

Data logging, recording forms, etc. can be found within EPT/ANS/A048, Section 17(Appendices) and EPT/ANS/A036 (Section 6)

4 *Safety and Tooling Requirements*

The safety details within EPT/ANS/A048 apply, plus:-

1. Relevant FTTC DSLAM documents contained with EPT/ANS/A036
2. Be skilled, qualified and competent to work on AC power systems
3. Have a valid A350 certificate for the work to be undertaken

4.1 **PPE**

PPE as already identified within EPT/ANS/A048 and EPT/ANS/A036

4.2 **Tools**

Tools as already identified within EPT/ANS/A048, plus:

Calibrated electrical test meters shall be used, also torque screw drivers where required

All hand tools used within the cabinet must be suitably insulated, in good condition and appropriate for the intended use.

5 *Power system - routine activities*

The following procedures outline the requirements of the scheduled FTTC site power routines. The periodicity of FTTC site power routines is currently set at 12 months. Power System routine activities outlined should be captured in documentation contained in Appendix A, B, and C of EPT/ANS/A048 and should be left at the relevant FTTC site.

Routine Maintenance for FTTC Cabinets will be undertaken in 4 ways:-

1. **Every Visit**
2. **6 Monthly Routine Tests depending on equipment fitted (e.g. RCD)**
3. **Once a year** – a scheduled visit to carry out a complete Routine Maintenance
4. **Mandatory Electrical Testing every 2.5 years**

In all instances when visiting the cabinet, the Engineer will contact AOC to inform start of DSLAM maintenance. AOC to monitor alarms and suppress any if generated. Engineer will complete the maintenance and confirm with the AOC that the DSLAM is clear of alarms before leaving site. AOC to record relevant information in LLUMS to include testing engineer's name.

The testing that is additional to EPT/ANS/A048 described in this document must only be undertaken by those suitably trained, competent and accredited.

5.1 Every Visit

As per EPT/ANS/A048.

5.2 Routine Maintenance Tasks - Once a year visits

If others are doing the testing as defined in EPT/ANS/A048, ensure it is still valid (i.e. in date), if not perform the required testing as per EPT/ANS/A048 plus:-

- 1) Earth connections within all areas (all cabinet types) are free of corrosion and oxidation, the cable insulation is not aged, damaged and the labelling is intact.
- 2) Check the continuity of bonding cables within the FTTC cabinet and the PCP (if relevant)

Note: Any defects, damage or corrosion to be repaired after agreement with AOC

- 3) Measure the earthing system resistance using the Electrical multifunction meter and check it aligns with the Ra reading on the certificate. Record the value on the earthing certificate in the cabinet and on electronic records – AOC to record to LLUMS. If the Ra reading is above the acceptable Ra value, issue a CAT1 status and arrange for rectification as per the timescales in EPT/ANS/A036. Check for any trend in earthing value that may indicate a failing system.
- 4) Check the continuity of bonding cables by both inspection and measurement within the FTTC cabinet and the PCP (if relevant).
- 5) Check that any RCD is performing to specification and measure the trip times using the electrical multifunction meter.
- 6) Rectify any issues with the system that can be done at the time.

5.3 Mandatory Electrical Testing every 2.5 years

Carry out 2.5-yearly **Electrical Installation Condition Report (Periodic Certificate)** using ISIS EPT/ANS/A036 as guidance. It should be possible to conduct this testing within the standby time of the battery system. It is important to remember that the earth electrode impedance within the cabinet has to be measured independently of the rest of the bonding and earthing system. The earthing requirement is as per the values stated in EPT/ANS/A036 and should be less than the maximum allowed. The original value of the earth impedance should be available on LLUMS and in the copy of the certificate in the cabinet. Check for any trend in earthing value that may indicate a failing system.

Completed and signed EIC report should be uploaded to LLUMS. A signed paper copy should be left in the plastic wallet in the cabinet.

5.4 In Depth Residual Current Device (RCD) Testing - 6 monthly

For full details of Functional Testing of RCDs refer to ISIS documents:-

- EPT/ANS/A036 - Section 6.1
- EPT/PPS/B062 - Section 3.4

Functional testing of the RCD - A requirement of the Wiring Regulations (BS 7671) is that an RCD shall be functionally tested every six months, and the test date noted. This applies to all RCD protected equipment / wiring that is within buildings and cabinets. The following procedures shall be followed:-

- A visual inspection of the RCD and its immediate surroundings shall be made. There should be no signs of discolouration or cracking of insulation of either the RCD or cables feeding into it.
- The engineer co-operates with the AOC and activates the button marked 'T' or 'TEST' on the RCD. The breaker should switch with a clean, crisp click and not give rise to any arcing sounds. Complete this function up to 5 times for functional testing.
- The engineer should then confirm with the AOC that a "power fail" alarm has been observed (note: poling window at the AOC is 3 minutes).
- The RCD breaker shall then be reset and remain in the ON position.
- The engineer then confirms that the RCD restores power to the DSLAM and that the AOC sees the "power fail" alarm clear.
- If the RCD does not activate when the test button is activated or the RCD does not reset then the engineer should investigate the failure of the RCD as far as they are competently able to do liaising with the AOC if it is proven faulty and in need of changing.
- The test date shall be logged on the relevant data system (LLUMS) and it will also be noted on the functional test sheet (RCD 6 Monthly Test Certificate) that resides within the cabinet (in a plastic wallet).

6 ***LLUMS asset, characteristic and fault data input***

As part of the routine DSLAM asset details will be checked and amended where necessary. The following characteristics will be entered into the PIRM asset database for each site routine completed:-

Power System output voltage (where measurement accessible)

Power System load current (where measurement accessible)

All power system faults information will be entered into the database.

7 *Faults found during routine maintenance*

An attempt will be made to repair all faults found during the routine procedure. Where an item cannot be repaired or an issue cannot be resolved on site the following action will be taken.

Power System faults requiring spares:-

Contact should be made with the AOC. Agreement will be reached with the AOC on how the fault will be rectified. Specific care should be taken to ensure that the task priority given provides sufficient time for the spares to be delivered and fitted. A Work Manager task will be generated.

8 *Battery replacement procedure*

The following details the actions and responsibilities of Openreach Power teams once a battery has failed its performance test. It covers both normal in service time expired failure and those that fail during warranty period.

When a battery no longer meets its standby time a decision will be taken as to whether it will be replaced and if it is to be replaced to what type of battery is to be installed. This decision will depend on several factors; the number of cells remaining in the Power Supply Unit (PSU), the type of cells, the PSU load etc. Appendix B & C of EPT/ANS/A048 detail the battery performance measurements and recording of battery changes. Further guidance regarding batteries is also to be found in EPT/ANS/A051.

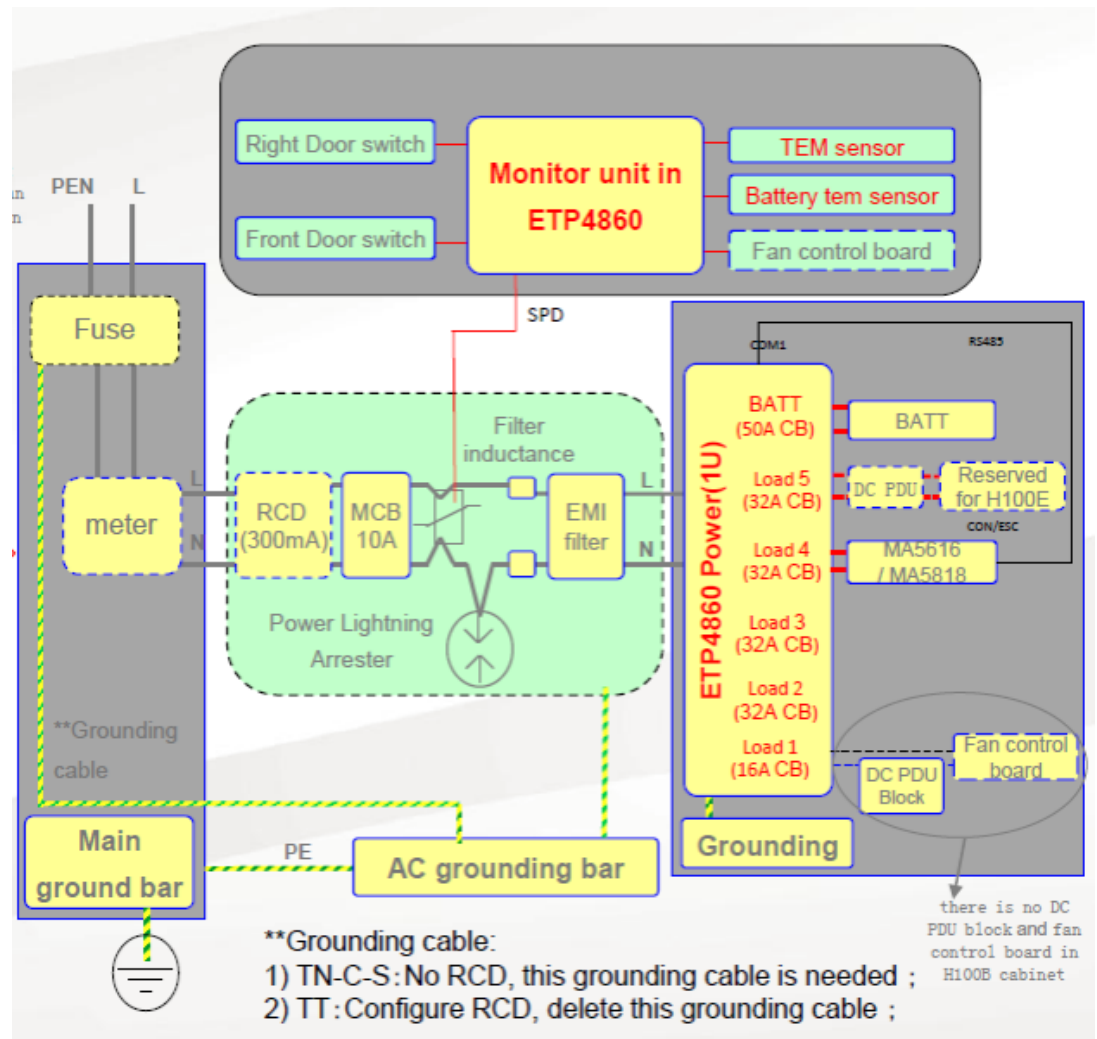
9 *H100A with new MA5818 - Power connections*

New H100A (small Huawei cabinet) with MA5818 VDSL DSLAM comes with new ETP4860 PSU.

See images below – including Power connection schematic from the new PSU. And some other useful info around PSU, monitoring and rectifiers.

Ignore load 1 and load 5 connections below as they are only needed for the HEX door addition and H100E PCP side pod power respectively when a PCP side pod is fed from this donor H100A cab. On day 1- you won't have a PCP side pod fed from this cab.


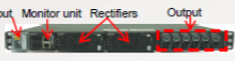
Attached is the H100A maintenance guide (Appendix A) – see section 2.15 if you have any issues with new ETP4860 PSU.






9.1 Details of PSU changes below:

1.2 H100A/H100B : Change the power system from ETP4830 to ETP4860



1.2.1 power system change:

	Now	To be	Comparison & Analysis	Change Impact
System Model	ETP4830	ETP4860	Different	Power system spare parts will be changed. 1.When the system frame or monitoring module is damaged, the entire power system needs to be replaced with ETP4860(includes frame, rectifier, monitor unit, monitor and output cables, etc.) 2.When the rectifiers of ETP4830 are damaged, they can be replaced individually
Appearance			Different Monitor unit and output are different	
Dimension	43.6mm(H) × 442mm(W) × 255mm(D)	43.6mm(H) × 442mm(W) × 255mm(D)	Same	No impact
Color	Black	Black	Same	No impact
Need DC PDU	Yes	No	Different New power system ETP4860 has more outputs. No need to configure a DC PDU	New build H100A/H100B: no need to configure a DC PDU Maintenance: remove the DC PDU
Rectifiers	2 pcs R4815N1 Rectifiers, 1000W/pcs, totally 2000W output.	2 pcs R4815G1 Rectifiers, 1000W/pcs, totally Max 2000W output.	Different New rectifiers are more efficient	No impact The new rectifier R4815G1 can adapt to the old power system ETP4830
Input terminal	M4 OT terminal	M4 OT terminal	Same	No impact
DC output terminal	Interconnection terminal	cord end terminals	Different	The output cables need to be replaced synchronously
DC output circuit breaker	3 ports outputs with fuses. Load1:20A Load2:20A BATT:20A	5 ports outputs with circuit breakers for load. Load1:16A Load2:32A Load3:32A Load4:32A Load5:32A BATT:50A	Different New power system ETP4860 has more outputs. The circuit breakers of the new power supply can be maintained ,replaced and expanded.	No impact because the new circuit breakers can also meet the output requirement

9.2 Alarm sensors are directly connected to monitoring unit of ETP4860. No need to configure a sensor access box.

	Now	To be	Comparison & Analysis	Change Impact
Monitoring Module	SMU01B (02310KFQ)	SMU11C (02312QJD)	Different	
Appearance			Different	The new and old power monitoring module cannot directly substitute each other. They have different dimensions for installation. when monitoring module is damaged, the entire power system needs to be replaced with ETP4860(includes frame, rectifier, monitor unit, monitor and output cables, etc.
Dimension	40.8mm(H) × 97mm(W) × 208mm(D)	40.6mm(H) × 51.5mm(W) × 193mm(D)	Different New monitoring modules are smaller than older ones	
Communications port	Northbound: RS485 Southbound: RS485	Northbound: RS485 Southbound: RS485	Same	
Other ports	Battery temperature sensor port DB5 port (connected to the sensor access box): one door status sensor port, one ambient temperature sensor port two midpoint voltage detection ports (SPD and fan control board alarm) 	Five DI ports (two ports can also be used as DO ports): one door status sensor port, one ambient temperature sensor port one battery temperature sensor port two midpoint voltage detection ports (SPD and fan control board alarm)	Different Alarm sensors are directly connected to monitor unit of ETP4860. No need to configure a sensor access box	New build H100A/H100B: no need to configure a sensor access box Maintenance: remove the sensor access box. Note: When replacing ETP4830/EP530-4815AF in existing H100A with 4860, if HEX door is installed on the cabinet, the monitoring configuration for HEX door should be updated, Huawei will provide installation guide for this procedure.
Monitor unit	With LED screen	No LED screen	Different	No impact

9.3 Details of Rectifiers changes

	Now	To be	Comparison & Analysis	Change Impact
Rectifier Module	R4815N1(02310JUJ)	R4815G1(02312QJR)	Different	
Appearance			Different	the sales and spare parts code is changed from 02310JUJ to 02312QJR. The new rectifier R4815G1 can adapt to the old power system ETP4830.
Dimension	40.8mm(H) × 95.5mm(W) × 208mm(D)	40.8mm(H) × 95.5mm(W) × 208mm(D)	Same	
Maximum power	R4815N1 : 1000W	R4815G1 : 1000W	Same	No impact
Efficiency	R4815N1: Maximum efficiency ≥ 94%	R4815G1: Maximum efficiency ≥ 96%	Different New rectifiers are more efficient	No impact

10 *Spares procedure*

Spares for FTTC site power systems will be provided via eASC and handled by Supply Chain Partners at the Local Stores Hub site. The basis of the standard process is that field engineers requiring replacement parts will order spares via eASC providing the necessary details of part numbers. Spares will be distributed to the requested delivery address, service point or alternatively delivered by Internal Stores to a convenient location. On completion of the task faulty or unused spares will be returned to Stores Hub Service points.

All emergency spares part requests will be completed by the AOC

11 *Outages, Precautionary Outages and Faults.*

There may be instances where for reasons of safety or service protection during fault finding procedures that a cabinet requires disconnecting from the network. The following outlines the process that should be adopted and the interaction between the field power engineer and AOC. Disconnection must be kept to a minimum, but without putting yourself at risk (i.e. no live working).

1. Power Engineer contacts AOC and request outage due to fault.
2. AOC contacts Power engineer (10-15mins delay) with outage PEW reference number.
3. On occasions, dependant on 'criticality' of site, the AOC will advise if work is to be carried out during preferred hours
4. Power Engineer completes fault activity.
5. Power Engineer contacts AOC and request for the site to be put back into service
6. AOC confirms alarms are clear.

12 *Method Statements*

On occasions, in order to perform fault and routine activities, Field Operations will request Method Statements and/or Risk Assessments. Copies of these can be found in Appendix F and G of EPT/ANS/A048.

13 *Technical Support*

Technical issues regarding NGA power systems should be referred via the AOC in the first instance or via the Openreach Chief Engineering office.

Periodically, technical updates and urgent field procedure changes will be issued via the Engineering memo systems.

14 Appendix A



F01H100A
Maintenance Guide 05

END OF DOCUMENT
