

Bicester Eco-Village

Fixed Network AMR Solutions

DATE: 06/11/15

1.1 Cover Letter

There are different types of Automatic Meter Reading solutions available, internal & external. Due to the nature of this site, an internal solution would not be practical. This is because there is a large number of single properties (houses) that do not have internal risers / corridors like the 3 storey blocks have, to house the internal equipment.

Internal solutions are used more in tower blocks, maisonette type buildings where there are a lot of meters closely located in a small area.

As Bicester is a more wide spread site, covering a large area, the roof top antenna solution is ideal.

The antennas will be connected to Izar RDC Premiums. These units are programmed with upload and download intervals, FTP server settings and a commissioned device list. For Concept 1 the RDC can be housed within the energy centre, or in an IP-Rated outdoor enclosure located on the roof top. Power points will be 230V AC un-switched fused spurs. There would be 2 x H2000 Flex data cables (16mm diameter) fed back from the antenna to the RDC.

For Concept 2 the un-switched power points would need to be installed within the internal riser cupboards of the blocks at the top floor (we specify un-switched so this eradicates any chance of the equipment being accidentally switched off by cleaners/other tradesman who have access to the riser cupboards).

RDC Premiums can take 1 X-Pol antenna, or 2 Yagi antennas. We then run the H2000 flex cables out of the riser, pinned to the ceiling (above the suspended ceiling) then up through a penetration mount, and run across the roof top to the antennas. The cable on the roof top would be sat on rubber mounted feet.

1.2 Roof top antenna Concept 1

From visiting the site at with Diehl at Bicester Eco-Village we were able to determine the best solution that would meet the needs of the Fixed Network AMR system.

We completed a thorough site survey and range test using a single X-Pol Kathrein antenna, and external radio modules (these modules act like heat meters and transmit the same frequency signal) from the roof of building 3.



We distributed the modules at different locations throughout the site, firstly within the HIU locations within the properties and secondly in hard to reach 'Black spots'. We then completed another range test from the roof of the energy Centre due to site specifications from Wilmott Dixon. The height this antenna would have to be installed is approximately 10 meters from the Energy Centre roof top. This has been deemed as unacceptable. This height is due to the Energy Centre being lower than Buildings 2 & 3, so the antenna line of site would have to be above the roof of buildings 2 & 3.

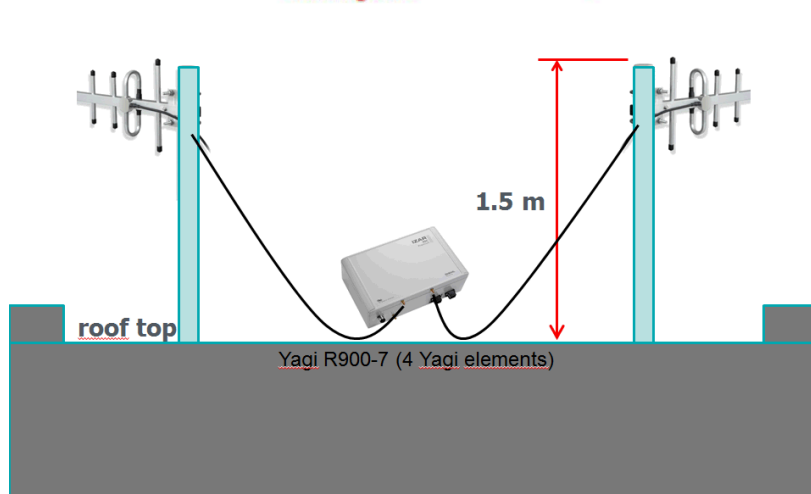
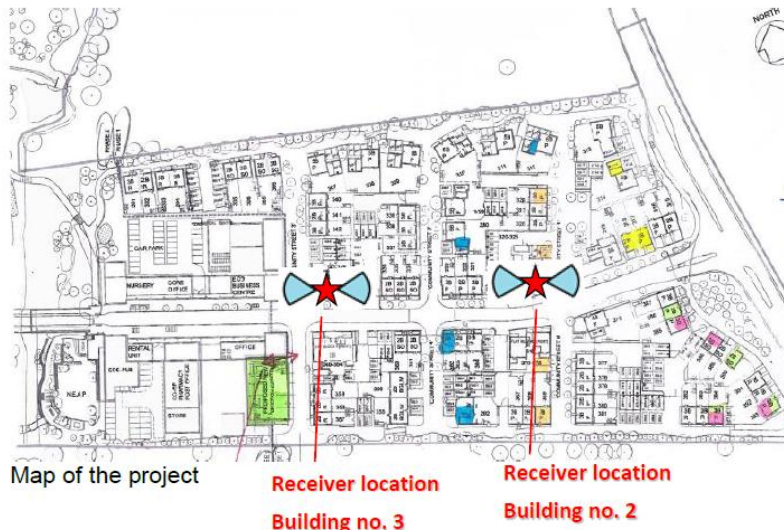


Building No. 1, Energy Center



1.3 Roof top antenna Concept 2

Due to the height the antenna would have to be installed with Concept 1, Diehl provided us with a 2nd solution that would counteract this issue. Concept 2 consists of 4 Yagi antennas, distributed across 2 buildings (2 & 3), 2 on each roof top.



The antenna's will be fixed to an upright stand approximately 1.5 meters tall, with an antenna outreach of approximately 1 meter.


2. EQUIPMENT SPECIFICATIONS

RDC Premium (used with both Concepts 1 & 2)

IZAR RDC PREMIUM

RADIO | RECEIVER

DIEHL
Metering




APPLICATION

The IZAR RDC PREMIUM is the most powerful Radio Data Concentrator of the Diehl Metering RDC product family. It enables wide area fixed networks for mass data transmission and network monitoring. With a maximum of four high-performance radio receivers, state of the art embedded technology and an industrial design, made for harsh outdoor conditions, it contributes significantly to a reduction of concentrator locations and therefore to a more efficient process. A high interoperability is achieved by the conformity to Open Metering System Specifications (OMS-5).

FEATURES

- ▶ Collection and processing of up to 10,000 radio devices
- ▶ Remote and local configuration
- ▶ Secure and flexible data export to FTP-server
- ▶ Intelligent telegram filter
- ▶ Automatic time synchronisation via Network Time Protocol (NTP)
- ▶ Downward-compatible with IZAR RADIO products
- ▶ Individual data logging (5 minutes – 24 hours)
- ▶ Receiving of meter data via 868 or 434 MHz
- ▶ Compression and encryption for data transport
- ▶ Central and individual firmware update
- ▶ Lockable housing, suitable for outdoor installation
- ▶ Power over Ethernet and line power in one device
- ▶ Four separate high-performance radio receiving modules



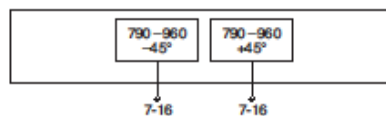
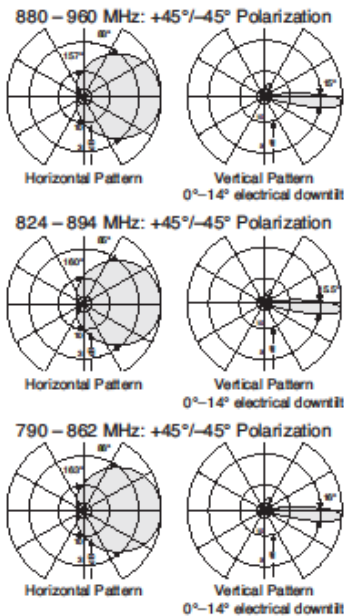
Concept 1 Kathrein x-Pol antenna

Panel 790-960
 Dual Polarization X
 Half-power Beam Width 85°
 Adjust. Electr. Downtilt 0°-14°
 set by hand or by optional RCU (Remote Control Unit)

KATHREIN
Antennen · Electronic

XPoI Panel 790-960 85° 13.5dBi 0°-14°T

Type No.	80010308v01		
	790-960		
Frequency range	790 – 862 MHz	824 – 894 MHz	880 – 960 MHz
Polarization	+45°, -45°	+45°, -45°	+45°, -45°
Average gain (dBi)	13.2 ... 13.3 ... 13.2	13.3 ... 13.4 ... 13.3	13.4 ... 13.5 ... 13.4
Tilt	0° ... 7° ... 14°	0° ... 7° ... 14°	0° ... 7° ... 14°
Horizontal Pattern:			
Half-power beam width	86°	85°	83°
Front-to-back ratio (180°±0°)	> 24 dB	> 24 dB	> 26 dB
Front-to-back ratio (180°±30°)	> 20 dB	> 22 dB	> 24 dB
Cross polar ratio	Typically: 20 dB	Typically: 20 dB	Typically: 20 dB
Sector	±60°	> 10 dB	> 10 dB
Tracking, Avg.	0.5 dB		
Squint	±1.5°		
Vertical Pattern:			
Half-power beam width	16°	15.5°	15°
Electrical tilt	0°-14°, continuously adjustable		
Sidelobe suppression for first sidelobe above main beam	0° – 7° – 14° T ≥ 17 – 16 – 16 dB	0° – 7° – 14° T ≥ 17 – 17 – 16 dB	0° – 7° – 14° T ≥ 17 – 16 – 16 dB
Impedance	50 Ω		
VSWR	< 1.5		
Isolation, between ports	> 30 dB		
Intermodulation IM3	< -150 dBc (2 x 43 dBm carrier)		
Max. power per input	500 W (at 50 °C ambient temperature)		



Mechanical specifications	
Input	2 x 7-16 female
Connector position	Bottom
Adjustment mechanism	1 x, Position bottom continuously adjustable
Wind load	Frontal: 430 N (at 150 km/h) Lateral: 200 N (at 150 km/h) Rearside: 590 N (at 150 km/h)
Max. wind velocity	200 km/h
Height/width/depth	1294 / 259 / 99 mm
Category of mounting hardware	M (Medium)
Weight	9 kg / 11 kg (clamps incl.)
Packing size	1586 x 292 x 138 mm
Scope of supply	Panel and 2 units of clamps for 42 – 115 mm diameter

906 39966b Subject to alteration.

Maybury Hill

VE-FRM-0016-v2.0

Concept 2 Yagi Antenna (R 900-10)

R 900-7/..., R 900-10/..., R 900-14/...

Directional Antennas with 7, 10 and 14 dBd Gain for the 900 MHz Band

DESCRIPTION

- These antennas are 4-, 8- and 18-element Yagi antennas with 7, 10, and 14 dBd gain, respectively.
- When mounted for vertical polarisation the horizontal coverage is R 900-7: 74°, R 900-10: 52° and R 900-14: 32°.
- These Yagis incorporate baluns optimized for wide bandwidth and accurate matching.
- The entire balun unit and feeder cable inlet are completely sealed in a polythene moulding ensuring permanent waterproof connections. The antennas are supplied with a 0.8 or 3 m "tail" of RG 213 terminated with an N-female connector. (See specifications).
- Radiating elements, supporting booms and adjoining metal castings have been constructed in high quality aluminium alloys to prevent corrosion. All metal parts are DC-grounded.
- The antennas are designed for back mounting and are provided with rear extended booms.
- These antennas can be stacked and fed in phase with a matching harness for increased gain.
- A mast clamp for fixation on 30 - 58 mm diameter mast tube is enclosed.



ORDERING DESIGNATIONS

FREQUENCY	820 - 900 MHz	
TYPE	PRODUCT NO.	
R 900-7/v	120000058	4-element Yagi 7 dBd
R 900-10/v	120000060	8-element Yagi 10 dBd
R 900-14/v	120000062	18-element Yagi 14 dBd
FREQUENCY	870 - 960 MHz	
TYPE	PRODUCT NO.	
R 900-7/h	120000059	4-element Yagi 7 dBd
R 900-10/h	120000061	8-element Yagi 10 dBd
R 900-14/h	120000063	18-element Yagi 14 dBd

SPECIFICATIONS

MODEL	R 900-7/...	R 900-10/...	R 900-14/...
ELECTRICAL			
ANTENNA TYPE	4-element Yagi	8-element Yagi	18-element Yagi
FREQUENCY	l: 820 - 900 MHz h: 870 - 960 MHz		
IMPEDANCE	50 Ω		
POLARIZATION	Vertical or horizontal		
GAIN	9 dBi 7 dBd	12 dBi 10 dBd	16 dBi 14 dBd
FRONT TO BACK RATIO	16 dB	20 dB	25 dB
HALF POWER BEAMWIDTH	E-plane: 56° H-plane: 74°	E-plane: 42° H-plane: 52°	E-plane: 23° H-plane: 32°
BANDWIDTH	80-90 MHz		
SWR	≤ 1.5		
MAX. POWER	150 W		
ANTISTATIC PROTECTION	All metal parts DC-grounded (Connector shows a DC-short)		
MECHANICAL			
TEMP. RANGE	-25°C + +60°C		
CONNECTION	0.8 m tail of RG 213 terminated with type "N" female connector	0.8 m tail of RG 213 terminated with type "N" female connector	3 m tail of RG 213 terminated with type "N" female connector
WIND SURFACE	0.034 m ²	0.047 m ²	0.091 m ²
WIND LOAD	43 N @ 160 km/h	59 N @ 160 km/h	119 N @ 160 km/h
COLOUR	"Aluminium"		
MATERIALS	Elements/Boom/Saddle clamps: Aluminium alloys. Fittings: Stainless steel. Bracket: Hot-dipped galvanized steel		
BOOM LENGTH	Approx. 0.69 m	Approx. 0.97 m	Approx. 2.04 m
BOOM DIA.	25.4 mm		
MAX. ELEMENT LENGTH	0.21 m		
DIA. OF ELEMENTS	9.5 mm		
WEIGHT	Approx. 2.1 kg	Approx. 2.8 kg	Approx. 4.2 kg
MOUNTING	Supplied with mast bracket suiting 30-58 mm dia. mast tube		

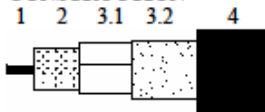
Antenna Data Cable

	TECHNICAL DATA SHEET	code	YE00115
		version	1
		date	2006-08-17
	COAX H2000 FLEX PVC	page	1/2

APPLICATION

Coaxial cables used for Radio-frequency designed according the International Standard IEC 1196.

CONSTRUCTION



- | | | |
|-----|-----------------|---|
| 1 | Inner conductor | Solid soft annealed copper |
| 2 | Dielectric | Gas injected PE |
| 3.1 | Foil | Copper-PET |
| 3.2 | Braid | Annealed copper |
| 4 | Sheath | PVC according the European Standard HD 624. |

REQUIREMENTS AND TEST METHODS

Test methods in accordance with International Standard IEC 1196.

Mechanical characteristics

1. Inner conductor:
 - Diameter: 2.62 mm ± 0.03 mm
2. Dielectric:
 - Diameter: 7.15 mm ± 0.2 mm
 - Centricity: ≥ 0.85
 - Adhesion: 41 – 410 N at 50 mm
3. Outer conductor:
 - Diameter screen: 7.8 mm ± 0.25 mm
 - Foil overlap: ≥ 2 mm
 - Coverage braid: 49 % ± 5 %
4. Sheath:
 - Diameter: 10.3 mm ± 0.3 mm
 - Tensile strength: ≥ 12.5 N/mm²
 - Elongation at break: ≥ 150 %
5. Cable:
 - Crush resistance of cable: < 1% (load of 700N)
 - Storage/operating temperature: -15°C to +70°C
 - Minimum installation temperature: -5 °C
 - Minimum static bend radius: 100 mm
 - Total weight: 141 g/m

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