



APPLICATION NOTE

XRF410N™

Installation

Reference Software Versions:

1.0

History

Issue	Date	Paragraph	Change
Rev. 0	February 13, 2015		First Release

INTRODUCTION

XRF410N (named for its eXtended Reading Field), is a product developed mainly for T&L applications with the goal of guaranteeing an extended horizontal field of view in order to fully cover the entire width of a conveyor.

It is made up of two Matrix 410N™ model readers (optically pre-configured and not modifiable). The readers are mounted onto a metal plate at a pre-defined distance from each other (pitch), which depends on the optical model. They are also connected together electrically by the ID-NET™ network.

The system therefore is pre-assembled and pre-configured to provide simpler installation.

Each M410N-XRF reader (including spare part readers) can only be used within an ID-NET™ network in which at least one other reader is present. **They cannot be used as Stand Alone devices.**

The various XRF410N models do not include CBX connection boxes or CBX connecting cables so it is necessary to refer to the accessories list tables for the required material.

In terms of product performance there are two models:

- **BP (Base Performance)** for low cost applications and medium line speed. These models have High Power Super Narrow Angle illuminators and use Image Cropping (to avoid the presence of multiple packs inside the acquired image simultaneously).
- **HP (High Performance)** for high line speed applications. These models have Ultra High Power illuminators and use full-frame images in PackTrack™ mode.

In addition, each of these is further divided into different optical models which are optimized for different code resolutions, reading distances and field of view.

The following table summarizes the main characteristics of the various models:

Model XRF410N	1D Code Resolution	Pitch [mm]	Lighting System	Reading Distance [mm]	DOF [mm]	Focus Dist. [mm]	PPI	FOV min. [mm]	Overlap min between readers [mm]	Others
BP- B0x Medium Res	0.38mm (15mils)	235	LT-10	1270- 1670	400	1570	91	590	120	Cropped Image: 1600x780
BP- B1x High Res	0.33mm (13mils)	175	LT-10	1050- 1450	400	1300	111	470	120	Cropped Image 1600x780
HP- H0x Medium Res	0.38mm (15mils)	235	LT-20	1270- 1670	400	1570	91	590	120	Full image & Packtrack
HP- H1x High Res	0.33mm (13mils)	175	LT-20	1050- 1450	400	1300	111	470	120	Full image & Packtrack
HP- H2x Very High Res	0.25mm (10mils)	155	LT-20	860-1110	250	960	147	395	85	Full image & Packtrack

Table 1 – Main Characteristics

In order to create multi-side or multi-point reading stations, the product line further includes the following models:

- **XRF410N-xx0 MASTER:** made up of two readers: one Master and one Slave 1. The Master must be connected directly to a **CBX** connection box through a **CAB-DS-xx-S** cable. The Slave is already connected to a QL100 which is provided with a CBL-1490 ID-NET™ network terminator. The other end of the QL100 must be connected to the CBX using a **CBL-1480-xx** cable to complete the ID-NET™ network.
- **XRF410N-xx1 EXTENSION:** made up of two Slave readers each connected to a QL100. These models must be connected to a **Master XRF410N** through the ID-NET™ network using a **CBL-1480-xx** cable to complete the ID-NET™ network.

One or more Extension XRF410N models can be chained together to extend the ID-NET™ network. When using the Extension models, the CBL-1490 ID-NET™ network terminator (present on the QL100 of the Slave reader on the Master XRF410N) must be transferred to the last slave on the last Extension XRF410N in the network.

The complete list of XRF410N models is:

Description	Part Number
XRF410N-B00 2HD_MED RES_MASTER	937400028
XRF410N-B10 2HD_HI RES_MASTER	937400029
XRF410N-H00 2HD_HI PERF_MED RES_MASTER	937400030
XRF410N-H10 2HD_HI PERF_HI RES_MASTER	937400031
XRF410N-H20 2HD_HI PERF_VHI RES_MASTER	937400032
XRF410N-B01 2HD_MED RES_EXTENSION	937400033
XRF410N-B11 2HD_HI RES_EXTENSION	937400034
XRF410N-H01 2HD_HI PERF_MED RES_EXTENS	937400035
XRF410N-H11 2HD_HI PERF_HI RES_EXTENS	937400036
XRF410N-H21 2HD_HI PERF_VHI RES_EXTENS	937400037

The list of XRF410N accessories used to complete each installation is:

Required Accessories for XRF410N Base Performance Models				
Description	1 Module	2 Modules	4 Modules	Part Number
XRF410N-B00 2HD_MED RES_MASTER	1	1	1	937400028
XRF410N-B01 2HD_MED RES_EXTENSION	-	1	3	937400033
CAB-ETH-M05 M12-IP67 ETHERNET CABLE (5M)	2	4	8	93A051348
CBL-1480-05 M12/5P MALE/FEMALE 5M IDNET	1	1	1	93A050051
CBL-1480-02 M12/5P MALE/FEMALE 2M IDNET	-	1	3	93A050050
CAB-DS05-S M12-IP67 TO CBX 5M	1	1	1	93A050060
CBX500 ATS-001 ASSEMBLY	1	1	1	93A301083
MEP-593 PHOTOCELL KIT	1	1	1	93ACC1791
OEK-2 OPTICAL ENCODER (CAB 10M+SPRING)	1	1	1	93ACC1770
BA400 M12 3P M. PANEL CONN. (EXT.POWER)	1	1	-	93ACC1853
CAB-PG-0002 VDC PWR PG120-IDNET 2M	1	1	-	93ACC1870
PG-120-K01 PWR SUPPLY KIT FOR M450 (EU)	1	1	-	93ACC0046
PWR-480B POWER UNIT 110/230VAC 24V	-	-	1	93ACC0076

The OEK-2 Encoder is necessary when using PackTrack™ Operating Mode.

Required Accessories for XRF410N High Performance Models				
Description	1 Module	2 Modules	4 Modules	Part Number
XRF410N-H10 2HD_HI PERF_HI RES_MASTER	1	1	1	937400031
XRF410N-H11 2HD_HI PERF_HI RES_EXTENS	-	1	3	937400036
CAB-ETH-M05 M12-IP67 ETHERNET CABLE (5M)	2	4	8	93A051348
CBL-1480-05 M12/5P MALE/FEMALE 5M IDNET	1	1	1	93A050051
CBL-1480-02 M12/5P MALE/FEMALE 2M IDNET	-	2	6	93A050050
CAB-DS05-S M12-IP67 TO CBX 5M	1	1	1	93A050060
CBX500 ATS-001 ASSEMBLY	1	1	1	93A301083
CAB-MLP-05 MULTI LIGHTING POWER 5M	1	1	1	93A050084
MEP-593 PHOTOCCELL KIT	1	1	1	93ACC1791
OEK-2 OPTICAL ENCODER (CAB 10M+SPRING)	1	1	1	93ACC1770
BA400 M12 3P M. PANEL CONN. (EXT.POWER)	1	-	-	93ACC1853
CAB-PG-0002 VDC PWR PG120-IDNET 2M	1	-	-	93ACC1870
PG-120-K01 PWR SUPPLY KIT FOR M450 (EU)	1	-	-	93ACC0046
PWR-480B POWER UNIT 110/230VAC 24V	-	1	1	93ACC0076

The OEK-2 Encoder is necessary when using PackTrack™ Operating Mode.

In addition, the following single Spare Part replacement readers (relative to the specific XRF410N model) available for order;

Description	Part Number
MATRIX 410N XRF-B0x SPARE UNIT-REPLMNT	937400038
MATRIX 410N XRF-B1x SPARE UNIT-REPLMNT	937400039
MATRIX 410N XRF-H0x SPARE UNIT-REPLMNT	937400040
MATRIX 410N XRF-H1x SPARE UNIT-REPLMNT	937400041
MATRIX 410N XRF-H2x SPARE UNIT-REPLMNT	937400042

INSTALLATION

GENERAL ID-NET™ CONFIGURATION

- When using a single XRF410N-xx0 MASTER, no ID-NET™ network configuration is necessary. This product leaves the factory pre-configured and the readers have respective Master and Slave 1 roles.
- When using one or more XRF410N-xx1 EXTENSION(s) with the XRF410N-xx0 MASTER, the first step is to configure the ID-NET™ network because the EXTENSION Slave readers leave the factory with the unusable Slave 0 role (jolly).

The installation procedure for multi XRF readers is summarized below:

1. Mount the various XRF410Ns to the station frame.
2. Connect the ID-NET™ cabling, moving the ID-NET™ terminator to the last node in the network.
3. Run DL.CODE™ and connect to the Master reader.
4. Run “New Configuration - Multi Device. This will assign ID-NET™ addresses to all the Slaves in the network associating them with their respective serial numbers. Click **Apply Changes**.

MOUNTING

For Top applications mount the positioning bracket to the Bosch frame using the two T-bolts and nuts through the **slots** in the bracket.

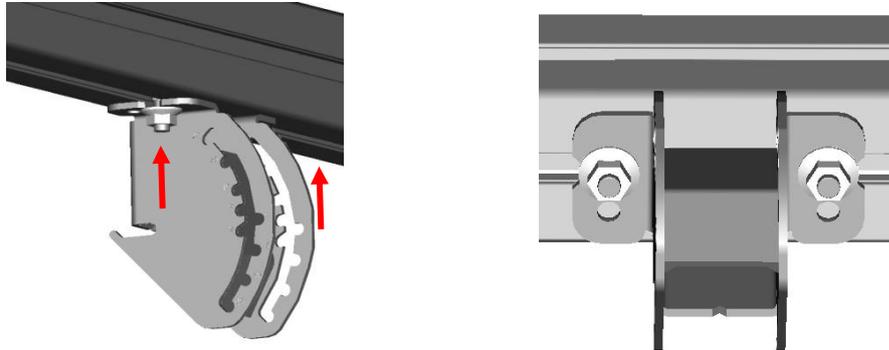


Figure 1 – Positioning Bracket Mounting to Frame

Next, install the front mounting bolt so that the XRF410N rests on the positioning bracket. This allows positioning to be done without having to physically support the weight of the XRF410N.

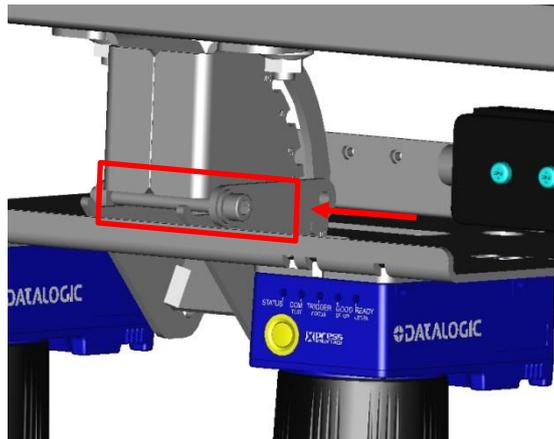


Figure 2 – XRF410N Mounting to Positioning Bracket

Now insert the back mounting bolt and position the plate into one of the pre-defined slots corresponding to the correct application angle. The angles are marked on the positioning bracket. The standard TOP installation is 15°.

When using multiple Modules on the same plane (Master + Extension(s)), the distance between readers must be maintained from one module to the next to guarantee uniform image acquisition overlapping.

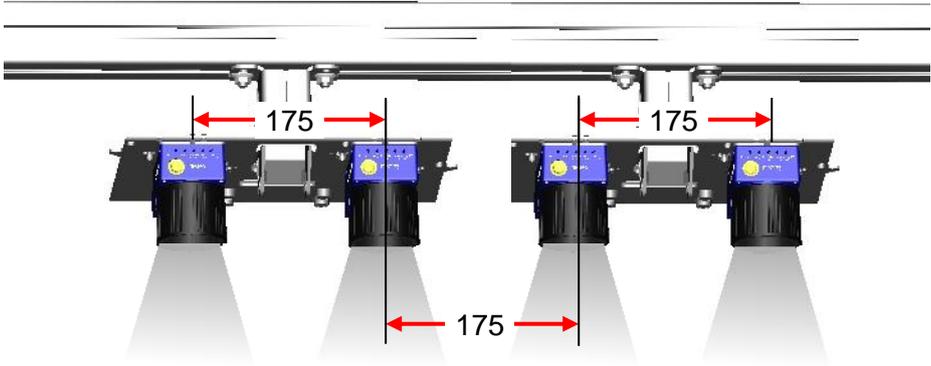


Figure 3 – Maintaining Pitch Between Multiple Modules

Example Mounting Distance for XRF410N B0x Models

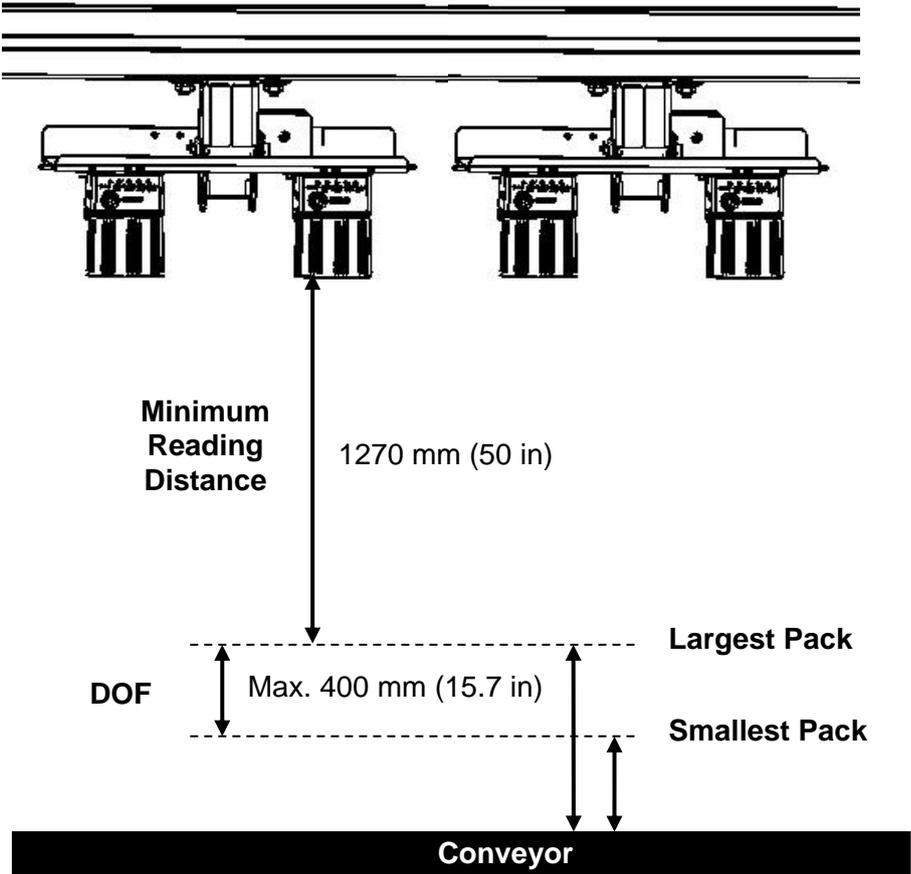


Figure 4 – Example Reading Distance Reference

DOF and Minimum Reading Distance data for each XRF410N model are given in Table 1 – Main Characteristics.

ELECTRICAL CONNECTIONS

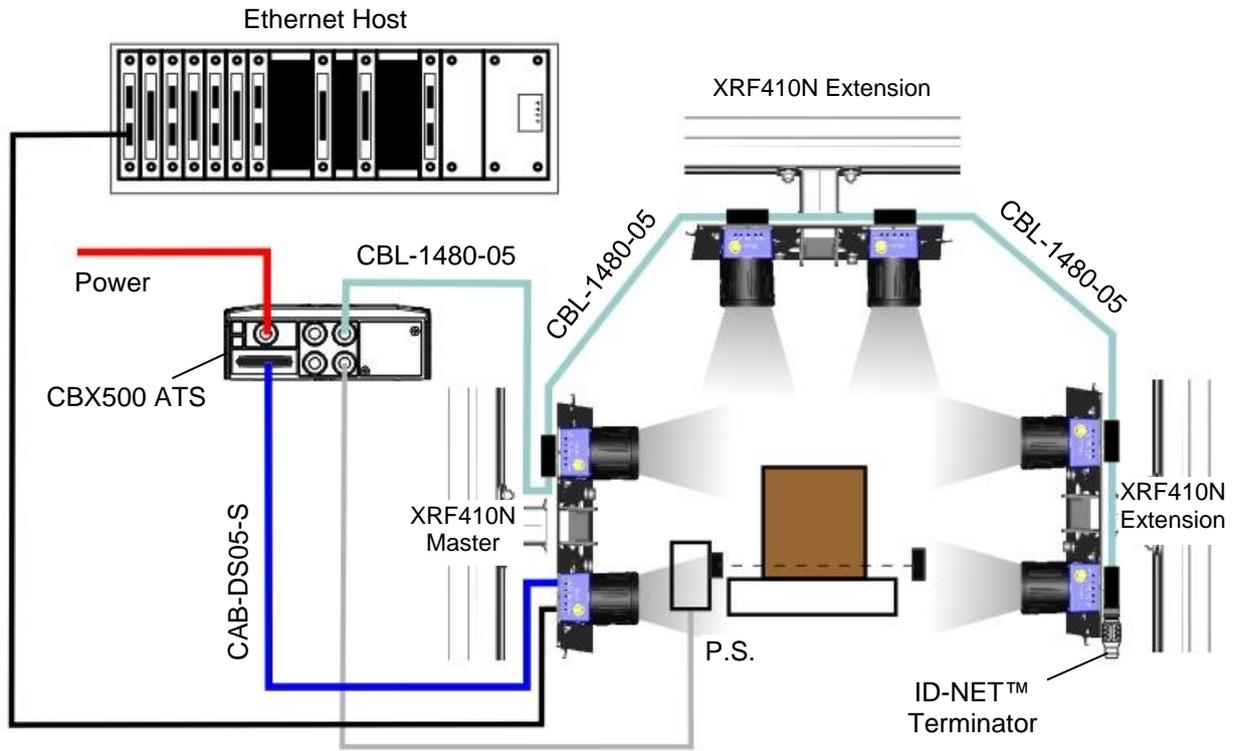


Figure 5 – Multiple Module Electrical Connections

SOFTWARE CONFIGURATION THROUGH DL.CODE™

DEFAULT CONFIGURATION

Each XRF410N model has its own default configuration (job) which is detailed in the tables and notes below. This job is loaded by default and should not be changed or deleted. Necessary modifications should be saved to a new job named for the application.

If the default job is ever accidentally deleted, backup files (.dlcfg) are provided in the DL.CODE™ mini-DVD (ISO file or accessory mini-DVD). They are located in the following directory:

DL.CODE 1.0\Software\SW Utilities

- All XRF410Ns are set to Phase Mode. The photocell (presence sensor) must be connected to Input 1.

The following table shows the **Image Setup** (photometric) parameters settings to use for each model based on the reference application (conveyor speed and code resolution) The Image Setup parameters can be modified if your application references are different.

XRF410N Model	Typical Application Characteristics		Image Setup				
	1D Code Resolution	Conveyor Speed [m/s]	Exposure Time [μs]	Gain	Gain Multiplier	Internal Lighting Mode	PPI
XRF410N-B0x Medium Res	0.38mm (15mils)	1.2	310	29	X1	Very High Power Strobe	91
XRF410N-B1x High Res	0.33mm (13mils)	1	320	36	X1	Very High Power Strobe	111
XRF410N-H0x Medium Res	0.38mm (15mils)	2.2	170	25	X1	Very High Power Strobe	91
XRF410N-H1x High Res	0.33mm (13mils)	1.8	160	35	X1	Very High Power Strobe	111
XRF410N-H2x Very High Res	0.25mm (10mils)	1.5	160	19	X1	Very High Power Strobe	147

Table 2 - Default Image Setup Configuration

In the **Reading Phase** step, set Acquisition Trigger Type to **Periodic**. The period to set depends on the application speed, the maximum code length, and the maximum pack height. To guarantee application functioning, two successive acquisitions must have an overlapping area in the direction of movement at least equal to the maximum code length.

XRF410N Model	Code Setup			Processing Mode	Reading-Phase		
	General Settings		Decoding Strategy		Image Buffer Size	Acquisition Trigger Type: Periodic [ms]	Delay on Internal Trigger [μ s] ²
Decoding Timeout Value [ms] ¹	Code Search Strategy						
XRF410N-B0x Medium res	130	Fast	Fast	Standard	20	45	Master = 0 Slave = 2000
XRF410N-B1x High res	130	Fast	Fast	Standard	20	35	Master = 0 Slave = 2000
XRF410N-H0x Medium res	160	Fast	Fast	Standard	20	60	Master = 0 Slave = 2000
XRF410N-H1x High res	160	Fast	Fast	Standard	20	60	Master = 0 Slave = 2000
XRF410N-H2x Very High res	160	Fast	Fast	Standard	20	60	Master = 0 Slave = 2000

Table 3 - Default Code Setup and Reading Phase Configuration

Note 1: Decoding Timeout

The Decoding Timeout default values are set based on a statistical analysis of decoding times measured on a variety of packs considered typical in various T&L applications. Decoding Timeout depends heavily on the type of acquired images. As a general rule it is suggested to set a value about equal to three times the Acquisition Period.

In case an application has difficulty decoding with the default values, it is possible to adapt the timeout setting, particularly for applications where the objects are homogenous.

For example in the case of very “noisy” objects (i.e. writing, repetitive patterns or reflections present in the area of the code) it is suggested to limit the Decoding Timeout value to two times the Acquisition Period, and possibly increase the frame rate to have some image redundancy.

Note 2: Delay on internal Trigger

In case of multiple XRF410Ns installed next to each other, it is necessary to set an Acquisition Trigger Delay between adjacent readers to avoid overexposure due to simultaneous illumination in the FOV.

In these conditions, for a TOP application it is suggested to set a 2 ms delay for all odd readers in the network while leaving the Master and all even Slaves without a delay (0 ms).

In TOP-SIDE installations it is left to the installer to set the correct delay to avoid simultaneous illumination in the FOV from more than one reader.



PACKTRACK CONFIGURATION

PackTrack applications have the same requirements and considerations as mentioned above for Phase Mode. They also require an Encoder to register line speed (conveyor).

In addition the PackTrack calibration procedure must be executed in DL.CODE™. See the DL.CODE User's Guide in the DL.CODE™ Help menu.