DFS150-485 2D Fixed Scanner
User Guide V1.0
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Chapter 1

Overview

Delta Fixed Barcode Scanner is capable to read 1D and 2D barcode. The communication interface is RS485 that supports Modbus and Private protocol. The Modbus mode supports parameter setting and barcode transmission, and private mode supports barcode transmission only.

Chapter 2

Interface

DFS150-485 has a 9-wire cable, beeper and 4 status LEDs as user interfaces. The wire and LED definitions are shown below.

Table 1. Cable wire definition

Color	Function
Green	FG
Black & White	OUT0
Orange	OUT1
Gray	IN
White	I/O COM
Yellow	RS485-N
Red	RS485-P
Brown	DC 24V
Blue	GND

Table 2. LED definition

LED	Definition
PWR	Power-On
OUT	OUT0: Ready
IN	Exposing
COMM	RS485 action

Chapter 2: Interface

2.1 Input and Output

DFS150-485 has 1 isolated input and 2 isolated output, both of them share an isolated common ground COM. The input is bi-direction, so that the COM can be connected to either ground or power while output is not connected.
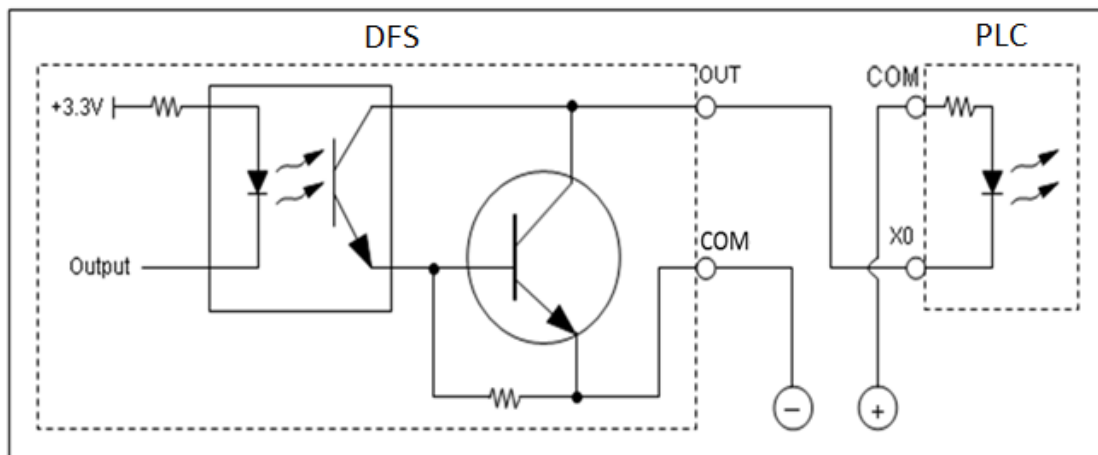
■ **Output Circuit Diagram (NPN Only)**

Figure 1. Output circuit diagram
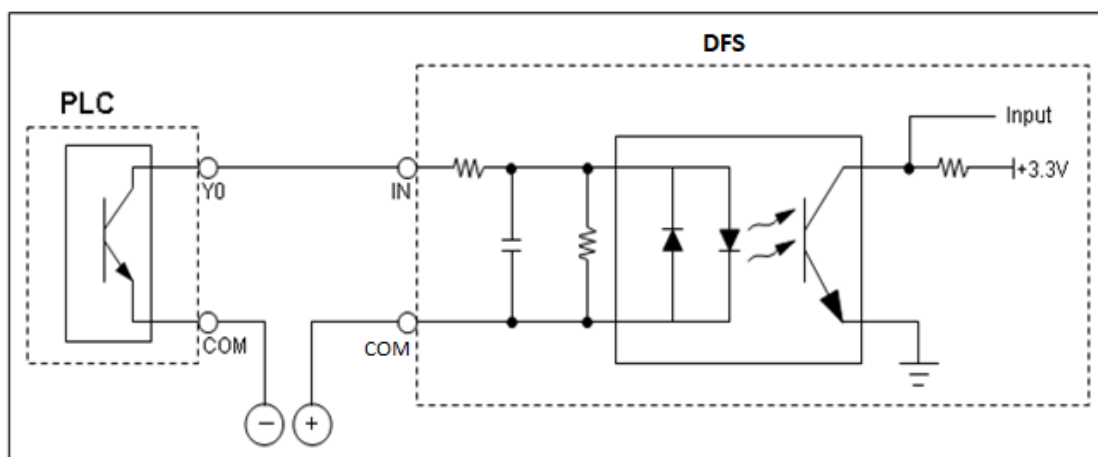
■ **Input Circuit Diagram (I/O COM connect to DC 24V)**

Figure 2.Input circuit diagram (NPN input)

※This wiring diagram can only be used when OUT0/1 are not be used.

■ **Input Circuit Diagram (I/O COM connect to GND)**
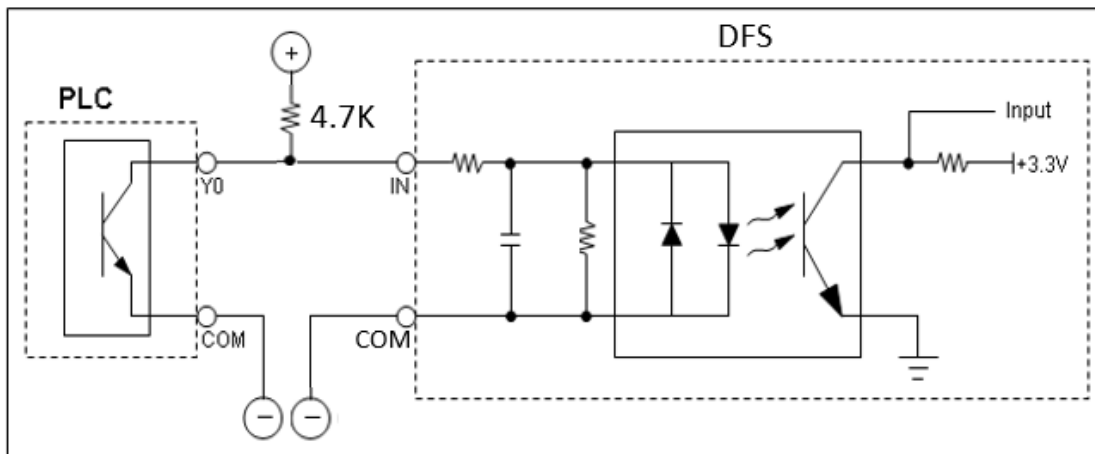
Figure 3. Input circuit diagram (NPN input)
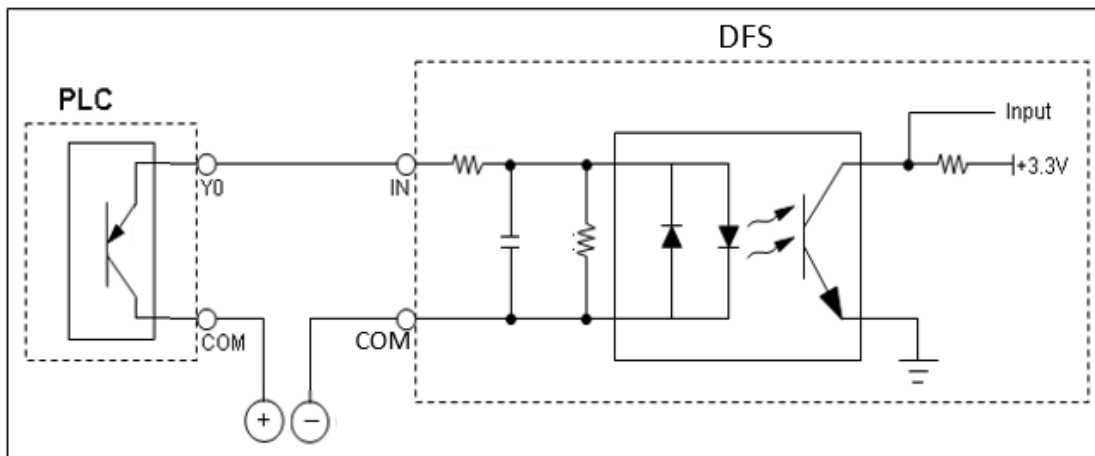
Figure 4. Input circuit diagram (PNP input)

2.2 RS485

RS485 is an asynchronous protocols, half duplex serial port, and the communication interface for control and barcode transition. It supports Modbus and Private protocols, both will be described in detail in chapter 4.

It supports the setting for baud rate, data bit length, parity type, and stop bit length. The setting will be effective after the next reboot with sending a software reset command or the power on reset. More details may be found in chapter 3. Flow control such as XON/OFF and RTS/CTS are not supported. The features and default setting are shown below.

2.2.1 Features

➤ Asynchronous transmissions and receptions.

➤ Baud rates: 9,600bps to 115200bps.

➤ Parity type: None, Even, Odd.

➤ Data length: 7 or 8 bits data.

➤ Stop bit length: 1 or 2 stop bits

Table 3. RS485 default setting

Item	Default
Baud Rate	115200 bps
Data Bits	8 bits
Parity	None
Stop Bits	1 bit

RS485 Setting

Bit	Name	Reset	Access	Description
7	SBL	0	RW	Stop Bit Length 0: SHORT STOP BIT (1bit) 1: LONG STOP BIT (2bits)
6:5	PT	0	RW	Parity Type 0: NONE PARITY (None) 1: ODD PARITY (Odd) 2: EVEN PARITY (Even) 3: RESERVED (Invalid value)
4:3	DBL	0	RW	Data Bit Length 0: 8bits 1: 7bits 2: Invalid value 3: Invalid value
2:0	BDR	0	RW	Baud Rate 0: 115200 bps 1: 57600 bps 2: 38400 bps 3: 19200 bps 4: 9600 bps 5: RESERVED (Invalid value)

2.3 LED & Beeper

Beeper makes a long beep during power up and short beep for successful barcode decoding. The beeper can be switch on/off by setting the control register. When it is switched off, it will beep during power up, but not during successful decoding.

There are four LEDs on DFS, **LED_PWR**, **LED_OUT**, **LED_IN** and **LED_COMM**. Their behavior is described as below:

PWR_LED: It indicates power status, always on when connected to power.

OUT_LED: It set to represent the OUT0 to confirm whether the system is in the busy period, decoding barcode.

IN_LED: It indicates whether the trigger is valid and acts when exposing.

COMM_LED: It represents DFS is in the start-up communication period after power on, and the communication traffic of RS485 when it is acting.

Figure 5 shows the behavior of LEDs and beeper after power on.
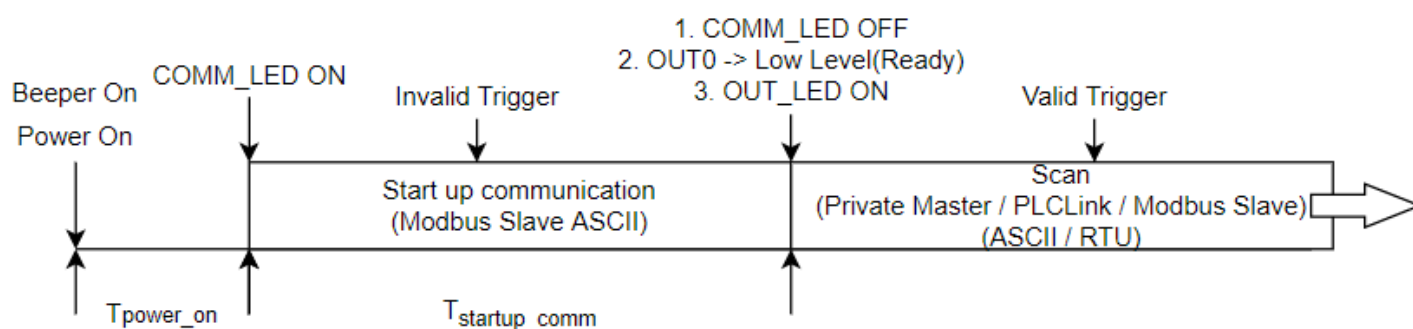
Figure 5. Behavior of LEDs after power on

Table 4. Beeper Setting

Addr.	Access	Bit	Symbol	Description	Min	Max	Default	Unit
0x0926	RW	[0]	*BEEP_EN*	0: Disable 1: Enable	0	1	1(on)	N/A

Chapter 3

Power On

DFS150-485 operation in three-modes, Master Private, Master Modbus and Slave Modbus modes. All these modes are valid after a start-up communication period followed the power on period $T\_(Power\_on)$. During the start-up communication period $T\_(startup\_comm)$, operation mode is fixed in Slave Modbus ASCII mode, all triggers are invalid. This period can be extended by sending arbitrary valid command to the scanner, and user may communicate with scanner in the extension communication period as long as they want until reboot or send software reset command.

If no command is received within $T\_(startup\_comm)$, ten seconds, it will switch to the scan mode set by user previously. The default scan mode is Slave Modbus ASCII mode. After set all parameters, DFS150-485 provides two ways to update the setting: reboot or send software reset command. The behaviors after $T\_(startup\_comm)$ are shown below.
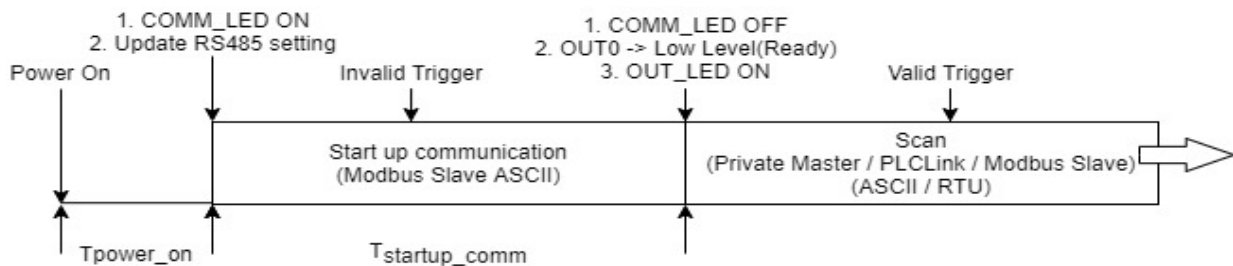
Figure 6. Start-up communication to Scan mode
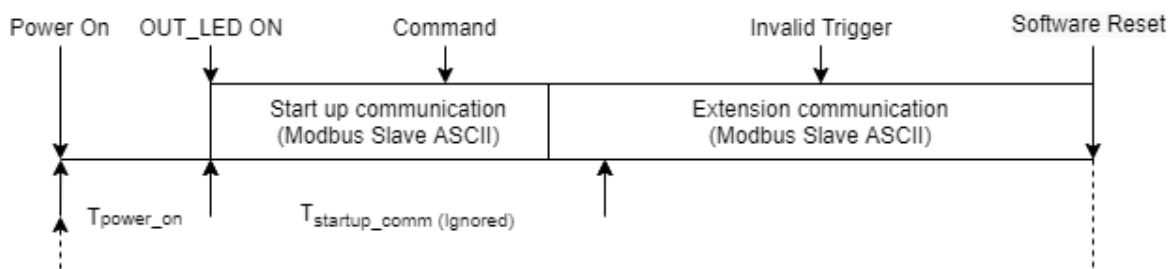
Figure 7. Extension communication

Chapter 4

Operation Mode

DFS150-485 provides user with three operating modes and two data types: Master Private, Master Modbus and Slave Modbus modes, and ASCII or RTU. The operation mode and data type can be set by the control register as shown in Scan Mode, Data type and Trigger Source

Table 7. Scan mode, Data type and Trigger Source Setting.

Master Private Mode provides user to get barcode without any protocol, it will send data to Slave devices automatically after successful decoding. It triggered by I/O or continuous mode.

Master Modbus Mode is used with PLC mostly. It provides user to receive barcode by I/O trigger or continuous trigger with Modbus protocol.

Slave Modbus Mode, the parameter can only be set in this mode, supports parameter setting and bar code transmission. The function code includes 0x03 - Read Holding Registers, 0x06 - Preset Single Register, and 0x10 - Preset Multiple Registers. User can generate triggers through I/O, command, or using continuous trigger mode to get the barcode with Modbus protocol.

4.1 Master Private Mode

Master Private Mode will send the decoded barcode directly without packaging any protocol, and add a carriage return suffix to all symbologies. The OUT0 signal goes low, indicating that the device is ready to receive a valid trigger by IN0 to get a falling edge. Figure 8 shows the contents of barcode and receiving data.

Figure 8. Master Private Mode barcode sample
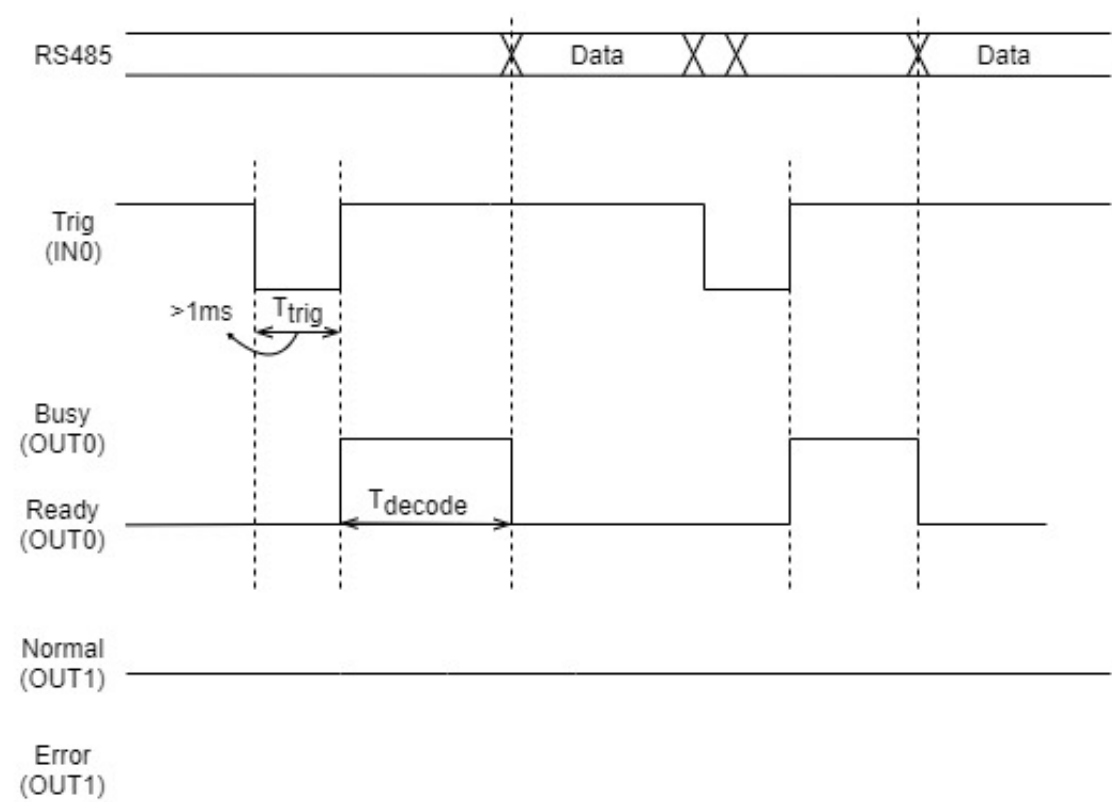
Figure 9. Master private mode timing diagram

4.2 Master Modbus Mode (PLC Link)

This mode sends the decoded barcode with Modbus packaged protocol. User can set the ID of slave device. Start address: the start address of data filling in. Timeout: the slave device should reply within this period. Retry times: if the slave device do not reply within timeout, DFS150-485 will retransmit the same packet no more than retry times. Finished flag: If the finished flag is set to one that indicated a packet of barcode has been transmitted.

Out1 will be set to low level (error status), if real retry times is bigger than three times or the time of ack is too long. Depends on the code length and transmit speed, if the code content is too long, then the data will shift over back to the first register but as this time system still waiting the ack, it will no longer to wait the third retry time and cause error. It will be reset to high level (normal status) when the new barcode is decoded.

The sample of format of decoded barcode, receiving data, and finished (completed) flag are shown as below.

Barcode

1234568790a

Setting

ID	01
Start Address	1000
Finished Flag Address	1200
Retry	3
Timeout(ms)	200

Data

:	01	10	10	00	00	06	0C	31
	32	33	34	35	36	37	38	39
	30	61	00	5F	CR LF			

Writing Finished Flag

:	01	06	12	00	00	01	E7	CR LF

Figure 10. Master Modbus Mode barcode sample
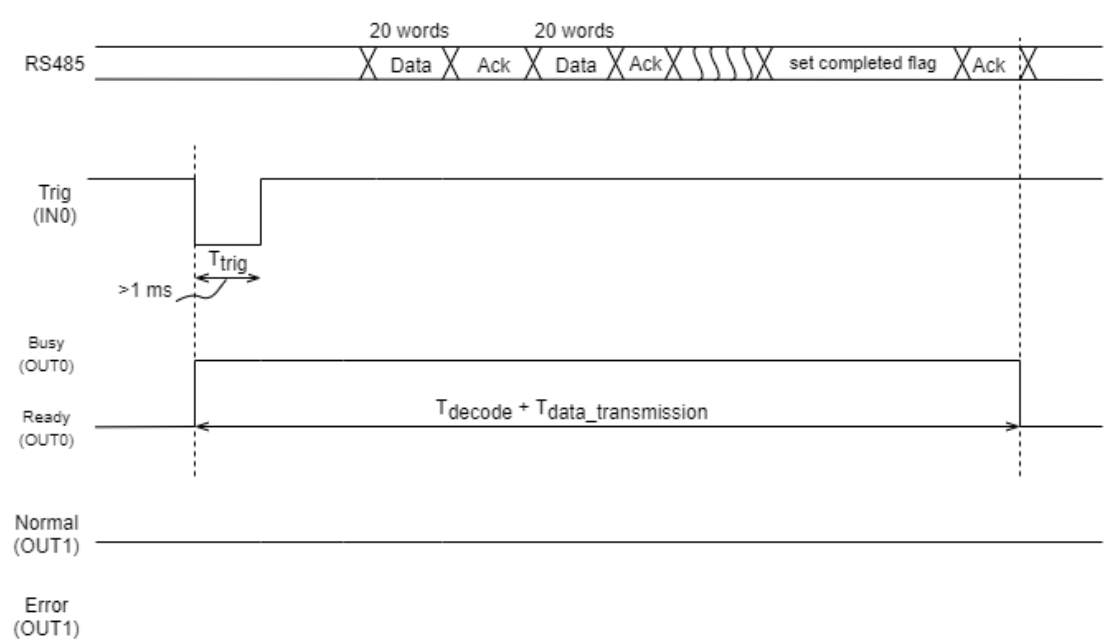
Figure 11. Master Modbus mode timing diagram
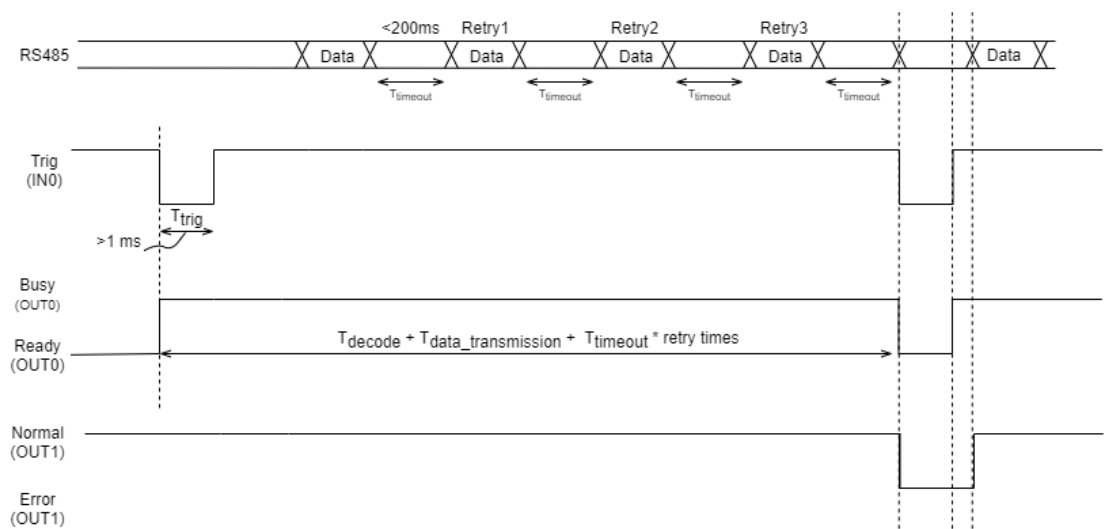
Figure 12. Master Modbus mode error situation

Table 5. Master Modbus Setting

Addr.	Access	Bit	Symbol	Description	Min	Max	Default	Unit
0x900F	RW	[0:7]	*PLC_LK_Slave_ID*	SLAVE_ID	1	255	1	N/A

4.3 Slave Modbus Mode

All parameters can only be set in this mode. The function code includes 0x03 - Read Holding Registers, 0x06 - Preset Single Register, and 0x10 - Preset Multiple Registers. Refer to Table 8. **Register Map** to set the parameters.

This mode provided the register for the master device to confirm the status. The barcode length of the latest data can be obtained by the register. If the length of reading command exceeds the real length of the barcode, response will add zero padding. After set the parameters, user can reboot DFS150-485 with software reset command. The details of status of barcode and software reset please refer to Table 6. Registers in Slave Modbus Mode.

In this mode, parameters setting and reading command allows for 10 registers (Words) Max at once. The reading length of barcode should smaller than 120 chars.

Barcode

1234568790a

Request: Read Length of Barcode

:	01	03	85	02	00	01	BA	CR LF

Response

:	01	03	02	00	0B	EF	CR LF

Request: Read Barcode

:	01	03	85	03	00	06	6E	CR LF

Response

:	01	03	0C	31	32	33	34	35
36	37	38	39	30	61	00	82	CR LF
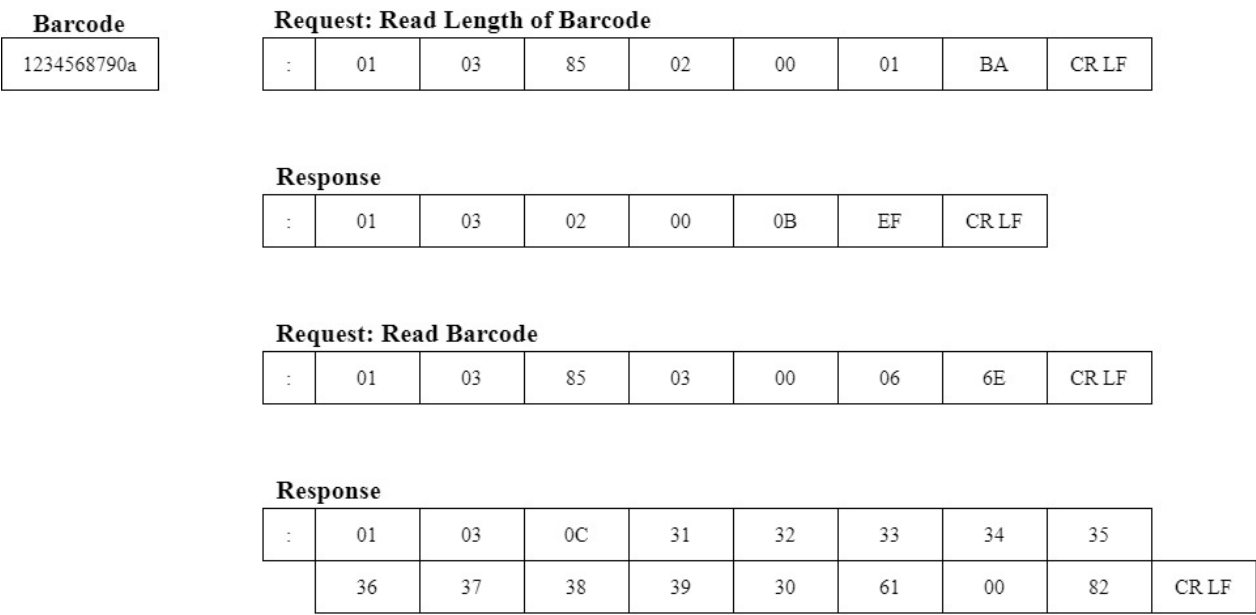
Figure 13. Slave Modbus barcode sample

Table 6. Registers in Slave Modbus Mode

Addr.	Access	Bit	Symbol	Description	Min	Max	Default	Unit
0x8501	RO	[0:1]	*Status of data*	0: The barcode has been taken or no barcode decoded. 2: The new bar code is decoded successfully. 3: The latest decoded bar code overwrote the previous bar code that has not been taken. If the barcode is taken by master device, status will reset to zero.	0	3	N/A	N/A
0x8502	RO	[0:6]	*Bar code length*	Reading Length	1	120	N/A	Bytes
0x8503	RO	[0:7]	*Bar code content*	Barcode Content	1	255	N/A	Words
0x900B	RW	[0:7]	*Slave ID*	Slave mode ID	0	255	1	N/A
0x900A	W	[0]	*Software Reset*	To reboot DFS	1	1	N/A	N/A

Chapter 5

5-1

Trigger

The type of the trigger can only be set in slave mode. This chapter describes the behavior of Trigger Source.

Please refer to Figure 14. Valid trigger to make a valid trigger.

Command Trigger and I/O Trigger cannot be used until status (as shown in Figure 15. Invalid Trigger) change to Scan state.

5.1 Continuous Trigger

Continuous Trigger Mode uses ambient light and scan engine illumination to detect barcodes. The LEDs remain dim until a barcode is presented to the scan engine, then the aimer turns on and the LEDs turn up to read the code. If the light level in the room is not high enough, Continuous Trigger Mode may not work properly.

5.2 I/O Trigger

I/O trigger must refer to OUT0 - ready signal to make a valid trigger. When Input receives falling edge and trigger is bigger than 1ms (refer to Figure 14. Valid trigger), the scan engine will continuous scan until either trigger timeout (30,000ms), or the barcode is decoded successfully.

5.3 Command Trigger

Only available in Slave mode. Using Modbus serial command to trigger the scan engine. The scanner continues scanning until a barcode is decoded successfully, or trigger timeout (30,000 ms).
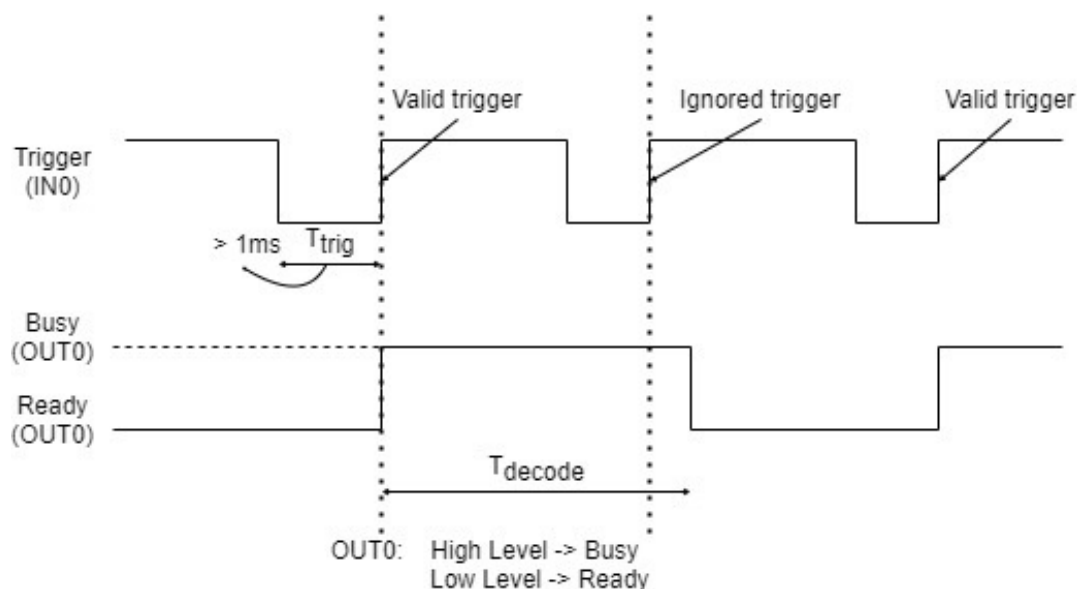
Figure 14. Valid trigger
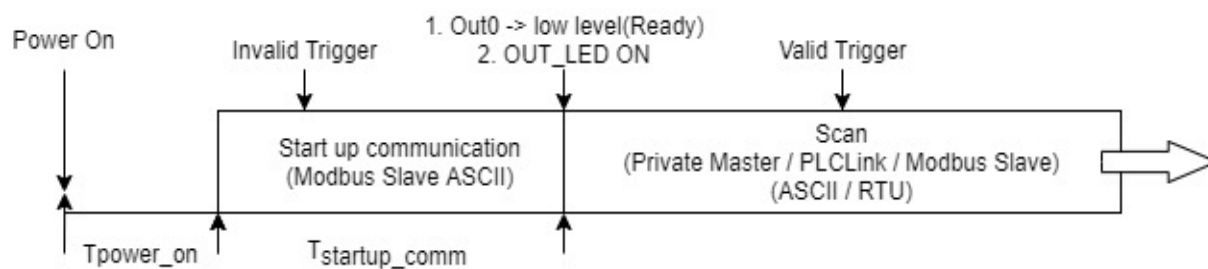
Figure 15. Invalid Trigger

Scan Mode, Data type and Trigger Source

Table 7. Scan mode, Data type and Trigger Source Setting

Address: 0x900C; Default Value: 3 (Slave Modbus, ASCII, Manual Trigger)				
Bit	**Name**	**Reset**	**Access**	**Description**
7:4	Reserved			
3	TRG	0	RW	Trigger Source 0: MANUAL TRIGGER 1: CONTIUNOUS TRIGGER
2	DTF	0	RW	Data Format 0: ASCII FORMAT 1: RTU FORMAT
1:0	CMM	3	RW	Communication Mode 0: Reserved 1: MASTER PRIVAT MODE 2: MASTER MODBUS MODE 3: SLAVE MODBUS MODE

Table 8. **Register Map**

Address	Access	Words	Name	Description
0x0926	R/W	1	BEP_EN	Beeper enable
0x0D3C	R/W	1	CONT_M_S	Continuous mode sensitivity
0x0F3D	R/W	5	CONT_M_CTR_WDW	Continuous mode centering windows
0x0B49	R/W	2	CONT_M_RRD	Continuous mode reread delay 1D and 2D
0x1146	R/W	1	PR_QLT_1D	Poor quality 1D barcode
0x1247	R//W	1	PR_QLT_PDF	Poor quality PDF barcode
0x113D	RW	5	MNL_M_CTR_WDW	Manual mode centering windows
0x132C	R/W	1	SCN_LED	Scanner LED – Illumination Light
0x1855	R/W	1	RVS_BRCD	Reverse barcode
0x1B58	R/W	10	BRCD_PRE	Barcode prefix(header)
0x1C58	R/W	10	BRCD_SUF	Barcode suffix(trailer)
0x8000	WO	1	ALL_SYMBOL_EN	All symbologies enable
0x8001	R/W	37	SYMBOL_EN	Symbologies enable
0x8900	RO	1	IMG_CAP	Image capture
0x8500	WO	1	CMD_TRIG	Command trigger
0x8501	RO	1	BRCD_STS	Barcode status
0x8502	RO	1	BRCD_LEN	Barcode length
0x8503	RO	120	BRCD_CONT	Barcode content
0x8800	RO	1	FW_VER	Firmware version
0x900A	WO	1	SW_RST	Software reset

0x900B	R/W	1	SLAVE_ID	Slave ID
0x900C	R/W	1	MODE_TRIG_DATA_TYPE	Scan mode, Data type, Trigger source
0x900D	WO	1	SYS_RST	System reset
0x900E	R/W	1	UART_SETTING	UART setting
0x900F	R/W	1	PLC_LK_SLAVE_ID	PLC link slave ID

Table 9. **Beeper Enable (0x0926)**

Bits	Default Value	Access	Description
0	1	R/W	The beeper may be programmed **On** or **Off** in response to a good read. 0: Off; 1: On

Table 10. **Continuous mode Sensitivity (0x0D3C)**

Bits	Default Value	Access	Description
4:0	1	R/W	Continuous Sensitivity is a numeric range (from 0-20) that increases or decreases the scan engine's reaction time to bar code. 0 is the most sensitive setting, and 20 is the least sensitive.

Continuous mode centering windows configuration

The value of left boundary must smaller than right boundary.

The value of top boundary must smaller than bottom boundary.

Table 11. **Continuous mode centering windows enable (0x0F3D)**

Bits	Default Value	Access	Description
0	0	R/W	Use centering windows to narrow the engine's field of view to make sure that reads only those barcodes intended by user. If Continuous Centering is turned on, the scanner only reads codes that pass through the centering window you specify using the command of **Left, Right, Top and Bottom of Continuous Centering Window.** If a barcode is not touched by a predefined window, it will not be decoded or output by the scanner. 0: Off; 1: On

Table 12. **Continuous mode centering windows - Left boundary (0x0F3E)**

Bits	Default Value	Access	Description
6:0	40	R/W	The left boundary (from 0-100) of centering window.

Table 13. **Continuous mode centering windows - Right boundary (0x0F3F)**

Bits	Default Value	Access	Description
6:0	60	R/W	The right boundary (from 0-100) of centering window.

Table 14. **Continuous mode centering windows - Top boundary (0x0F40)**

Bits	Default Value	Access	Description
6:0	40	R/W	The top boundary (from 0-100) of centering window.

Table 15. **Continuous mode centering windows - Bottom boundary (0x0F41)**

Bits	Default Value	Access	Description
6:0	60	R/W	The bottom boundary (from 0-100) of centering window.

Appendix

Continuous mode reread delay

This sets the time period before the scan engine can read the same barcode a second time. Setting a reread delay protects against accidental rereads of the same barcode.
Reread Delay only works when in a **Continuous Mode**.

Table 16. **Continuous mode reread delay (0x0B49)**

Bits	Default Value	Access	Description
14:0	750 (ms)	R/W	Value range: 0-30000 (ms)

If you wish to set a separate Reread Delay for 2D barcodes, set one of the valid value that follows. **2D Reread Delay Off** indicates that the time set for **Reread Delay** is used for both 1D and 2D barcodes.

Table 17. **Continuous mode 2D reread delay (0x0B4A)**

Bits	Default Value	Access	Description
14:0	0 (ms)	R/W	Value range: 0-30000 (ms)

Poor quality codes

Table 18. **Poor quality 1D barcode (0x1146)**

Bits	Default Value	Access	Description
0	0	R/W	The setting improves the scanner's ability to read damaged or badly printed linear bar codes. When **Poor Quality 1D Barcode** is enable, poor quality linear bar code reading is improved, but the scanner's snappiness is decreased, making it less aggressive when reading good quality bar codes. 0: disable; 1: enable

Table 19. **Poor quality PDF barcode (0x1247)**

Bits	Default Value	Access	Description
0	0	R/W	This setting improves the scanner's ability to read damaged or badly printed PDF codes. When **Poor Quality PDF On** is enable, poor quality PDF code reading is improved, but the scanner's snappiness is decreased, making it less aggressive when reading good quality bar codes. code reading. 0: disable; 1: enable

Manual mode centering windows configuration

The value of left boundary must smaller than right boundary.

The value of top boundary must smaller than bottom boundary.

Table 20. **Manual mode centering windows enable (0x113D)**

Bits	Default Value	Access	Description
0	0	R/W	Use centering windows to narrow the engine's field of view to make sure that reads only those barcodes intended by user. If Manual Centering is turned on, the scanner only reads codes that pass through the centering window you specify using the command of **Left, Right, Top and Bottom of Manual Centering Window.** If a barcode is not touched by a predefined window, it will not be decoded or output by the scanner. 0: Off; 1: On

Table 21. **Manual mode centering windows - Left boundary (0x113E)**

Bits	Default Value	Access	Description
6:0	40	R/W	The left boundary (from 0-100) of centering window.

Table 22. **Manual mode centering windows - Right boundary (0x113F)**

Bits	Default Value	Access	Description
6:0	60	R/W	The right boundary (from 0-100) of centering window.

Table 23. **Manual mode centering windows - Top boundary (0x1140)**

Bits	Default Value	Access	Description
6:0	40	R/W	The top boundary (from 0-100) of centering window.

Appendix

Table 24. **Manual mode centering windows - Bottom boundary (0x1141)**

Bits	Default Value	Access	Description
6:0	60	R/W	The bottom boundary (from 0-100) of centering window.

Table 25. **Scanner LED - Illumination light (0x132C)**

Bits	Default Value	Access	Description
0	1	R/W	If you want the illumination lights on while reading a bar code, set the value to 1. However, if you want to turn off the lights, set the value to 0. This setting does not affect the aimer light. 0: Off; 1: On

Table 26. **Reverse barcode (0x1855)**

Bits	Default Value	Access	Description
0:1	0	R/W	Reverse barcode is used to allow the scan engine to read bar codes that are inverted. Valid value: 0: Reverse barcode off 1: Reverse barcode only, read only inverted barcodes 2: Reverse barcode and standard barcodes Images capture function with the address 0x8900 from the scanner are not reversed. This is a setting for decoding only.

Data Editing

Prefix and Suffix characters are data characters that can be sent before and after decoded data. This setting is for all symbologies.

The maximum size of a prefix or suffix configuration is 10 characters.

All modification of prefix and suffix will overwrite the previous one. User must set the prefix or suffix from a fixed address so that it cannot be revised a character at specified address individually.

Table 27. **Barcode prefix (0x1B58)**

Bits	Default Value	Access	Description
6:0	N/A (No Prefix)	R/W	Determine the hex value from ASCII table. Valid range: 0x20-0x7F If you want to remove the prefix of barcode, set the value to **0**. To add blackslash(\), set the value to 5C twice.

Table 28. **Barcode suffix (0x1C58)**

Bits	Default Value	Access	Description
6:0	N/A (No Suffix)	R/W	Determine the hex value from ASCII table. Valid range: 0x20-0x7F If you want to remove the prefix of barcode, set the value to **0**. To add blackslash(\), set the value to 5C twice.

Appendix

Symbologies

Table 291. **All symbologies enable (0x8000)**

Bits	Default Value	Access	Description
0	N/A	WO	If you want to decode all the symbologies, set the value to **1**. Enable all the symbologies will increase the decoding time, if the type of barcode is specific, it is recommended to enable those to increase the decoding speed. The default setting of all the symbologies as shown below.

Table 30. **CodaBar enable (0x8001)**

Bits	Default Value	Access	Description
0	1	R/W	CodaBar On/Off 0:Off,　1:On

Table 31. **Code39 enable (0x8002)**

Bits	Default Value	Access	Description
0	1	R/W	Code39 On/Off 0:Off,　1:On

Table 32. **Interleaved 2 of 5 enable (0x8003)**

Bits	Default Value	Access	Description
0	1	R/W	Interleaved 2 of 5 On/Off 0:Off,　1:On

Table 33. **NEC 2 of 5 enable (0x8004)**

Bits	Default Value	Access	Description
0	1	R/W	NEC 2 of 5 On/Off 0:Off,　1:On

Table 34. **Code93 enable (0x8005)**

Bits	Default Value	Access	Description
0	1	R/W	Code93 On/Off 0:Off,　1:On

Table 35. **Straight 2 of 5 Industrial enable (0x8006)**

Bits	Default Value	Access	Description
0	0	R/W	Straight 2 of 5 Industrial On/Off 0:Off,　1:On

Table 36. **Straight 2 of 5 IATA enable (0x8007)**

Bits	Default Value	Access	Description
0	0	R/W	Straight 2 of 5 IATA On/Off 0:Off, 1:On

Table 37. **Matrix 2 of 5 enable (0x8008)**

Bits	Default Value	Access	Description
0	0	R/W	Matrix 2 of 5 On/Off 0:Off, 1:On

Table 38. **Code11 enable (0x8009)**

Bits	Default Value	Access	Description
0	0	R/W	Code11 On/Off 0:Off, 1:On

Table 39. **Code128 enable (0x800A)**

Bits	Default Value	Access	Description
0	1	R/W	Code128 On/Off 0:Off, 1:On

Table 40. **ISBT 128 Concatenation enable (0x800B)**

Bits	Default Value	Access	Description
0	0	R/W	ISBT 128 Concatenation On/Off 0:Off, 1:On

Table 41. **GS1-128 enable (0x800C)**

Bits	Default Value	Access	Description
0	1	R/W	GS1-128 On/Off 0:Off, 1:On

Table 42. **Telepen enable (0x800D)**

Bits	Default Value	Access	Description
0	0	R/W	Telepen On/Off 0:Off, 1:On

Table 43. **UPC-A enable (0x800E)**

Bits	Default Value	Access	Description
0	1	R/W	UPC-A On/Off 0:Off, 1:On

Appendix

Table 44. **UPC-A/EAN-13 with Extended Coupon Code-A enable (0x800F)**

Bits	Default Value	Access	Description
1:0	0	R/W	UPC-A/EAN-13 with Extended Coupon Code On/Off 0: Off, 1: Allow Concatenation when the scanner sees the coupon code and the extended coupon code in a single scan, it transmits both as one symbologies. Otherwise, it transmits the first coupon code it reads. 2: Require Concatenation the scanner must see and read the coupon code and extended coupon code in a single read to transmit the data. No data is output unless both codes are read.

Table 45. **EAN/JAN-13 enable (0x8010)**

Bits	Default Value	Access	Description
0	1	R/W	EAN/JAG-13 On/Off 0:Off, 1:On

Table 46. **EAN/JAN-8 enable (0x8011)**

Bits	Default Value	Access	Description
0	1	R/W	EAN/JAG-8 On/Off 0:Off, 1:On

Table 47. **MSI enable (0x8012)**

Bits	Default Value	Access	Description
0	0	R/W	MSI On/Off 0:Off, 1:On

Table 48. **GS1 DataBar Omnidirectional enable (0x8013)**

Bits	Default Value	Access	Description
0	1	R/W	GSI DataBar-Omnidirectional On/Off 0:Off, 1:On

Table 49. **GS1 DataBar Limited enable (0x8014)**

Bits	Default Value	Access	Description
0	1	R/W	GS1 DataBar Limited On/Off 0:Off, 1:On

Table 50. **GS1 DataBar Expanded enable (0x8015)**

Bits	Default Value	Access	Description
0	1	R/W	GS1 DataBar Expanded On/Off 0:Off, 1:On

Table 51. **Trioptic enable (0x8016)**

Bits	Default Value	Access	Description
0	0	R/W	Trioptic On/Off 0:Off, 1:On

Table 52. **Codablock A enable (0x8017)**

Bits	Default Value	Access	Description
0	0	R/W	Codablock A On/Off 0:Off, 1:On

Table 53. **Codablock F enable (0x8018)**

Bits	Default Value	Access	Description
0	0	R/W	Codablock F On/Off 0:Off, 1:On

Table 54. **Label Code enable (0x8019)**

Bits	Default Value	Access	Description
0	0	R/W	Label CodeOn/Off 0:Off, 1:On

Table 55. **PDF417 enable (0x801A)**

Bits	Default Value	Access	Description
0	1	R/W	PDF417 On/Off 0:Off, 1:On

Table 56. **MicroPDF417 enable (0x801B)**

Bits	Default Value	Access	Description
0	0	R/W	MicroPDF417 On/Off 0:Off, 1:On

Table 57. **GS1 Composite Codes enable (0x801C)**

Bits	Default Value	Access	Description
0	0	R/W	GS1 Composite Codes On/Off 0:Off, 1:On

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Table 58. **TCIF Linked Code 39 enable (0x801D)**

Bits	Default Value	Access	Description
0	0	R/W	TCIF Linked Code39 On/Off 0:Off, 1:On

Table 592. **QR Code enable (0x801E)**

Bits	Default Value	Access	Description
0	1	R/W	QR code On/Off 0:Off, 1:On

Table 60. **Data Matrix enable (0x801F)**

Bits	Default Value	Access	Description
0	1	R/W	Data Matrix On/Off 0:Off, 1:On

Table 61. **MaxiCode enable (0x8020)**

Bits	Default Value	Access	Description
0	0	R/W	MaxiCode On/Off 0:Off, 1:On

Table 62. **Aztec Code enable (0x8021)**

Bits	Default Value	Access	Description
0	1	R/W	Aztec Code On/Off 0:Off, 1:On

Table 63. **Chinese Sensible (Han Xin) Code enable (0x8022)**

Bits	Default Value	Access	Description
0	0	R/W	Chinese Sensible(Han Xin) Code On/Off 0:Off, 1:On

Table 64. **UPC - E0 enable (0x8023)**

Bits	Default Value	Access	Description
0	1	R/W	UPC-E0 On/Off 0:Off, 1:On

Table 65. **UPC – E1 enable (0x8024)**

Bits	Default Value	Access	Description
0	0	R/W	UPC-E1 On/Off 0:Off, 1:On

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Table 66. **GS1 Emulation enable (0x8025)**

Bits	Default Value	Access	Description
2:0	0	R/W	The scanner can automatically format the output from any GS1 data carrier to emulate what would be encoded in an equivalent GS1-128 or GS1 DataBar symbol. GS1 data carriers include UPC-A and UPC-E, EAN-13 and EAN-8, ITF-14, GS1-128, and GS1-128 DataBar and GS1 Composites. 0: Disable GS1 Emulation 1: All retail codes(UPC - E, EAN8, EAN13) are expanded out to 16 digits. The value will be the GS1-128. 2: All retail codes(UPC - E, EAN8, EAN13) are expanded out to 16 digits. The value will be the GS1-DataBar 3: The retail code expansion is disabled. 4: All EAN8 bar codes are converted to EAN13 format.

Table 67. **Command Trigger (0x8500)**

Bits	Default Value	Access	Description
0	N/A	WO	You can active the scan engine with serial trigger command, set the value to 1.

Table 68. **Barcode Status (0x8501)**

Bits	Default Value	Access	Description
1:0	N/A	RO	0: The barcode has been taken or no bar code has been decoded. 2: The new barcode is decoded successfully. 3: The latest decoded bar code overwrote the previous barcode that has not been taken. If the barcode is taken by master device, status will reset to zero.

Table 69. **Barcode Length (0x8502)**

Bits	Default Value	Access	Description
6:0	N/A	RO	In slave Modbus mode, the length of barcode should no more than 120 characters.

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Table 70. **Barcode Content (0x8503-0x853E)**

Bits	Default Value	Access	Description
7:0	N/A	RO	In slave Modbus mode, the length of barcode should no more than 120 characters. 1 word(2bytes) = 2 barcode data (ASCII mode)

Table 71. **Firmware Version (0x8800)**

Bits	Default Value	Access	Description
15;0	N/A	RO	Firmware Version

Table 72. **Software Reset (0x900A)**

Bits	Default Value	Access	Description
0	N/A	WO	After set the parameters, user can reboot DFS by set the value to one.

Table 73. **Slave ID (0x900B)**

Bits	Default Value	Access	Description
7:0	1	WR	The Slave ID in slave Modbus mode.

Table 74. **Scan mode Trigger and Data Type (0x900C)**

Address: 0x900C; Default Value: 3 (Slave Modbus, RTU, Manual Trigger)				
The register will be effective after $T_{startup\_comm}$. Refer to $T_{startup\_comm}$ on **Chapter 3**				
Bits	**Name**	**Reset**	**Access**	**Description**
7:4			Reserved	
3	TRG	0	RW	Trigger Source 0: MANUAL TRIGGER 1: CONTINUOUS TRIGGER
2	DTF	0	RW	Data Format 0: ASCII FORMAT 1: RTU FORMAT
1:0	CMM	3	RW	Communication Mode 0: Reserved 1: MASTER PRIVATE MODE 2: MASTER MODBUS MODE 3: SLAVE MODBUS MODE

Table 75. **System reset (0x900D)**

Bits	Default Value	Access	Description

| 7:0	1	WR	This selection erases all your setting and resets the DFS to the original factory defaults.

Table 76. **Uart Setting (0x900E)**

Address: 0x900E;   Default Value: 0 (115200, 8, N, 1)

The register will be effect after the next reboot.

Bit	Name	Reset	Access	Description
7	SBL	0	RW	Stop Bit Length 0: SHORT STOP BIT (1bit) 1: LONG STOP BIT (2bits)
6:5	PT	0	RW	Parity Type 0: NONE PARITY 1: ODD PARITY 2: EVEN PARITY 3: RESERVED (Invalid value)
4:3	DBL	0	RW	Data Bit Length 0: 8 BITS 1: 7 BITS 2: RESERVED (Invalid value) 3: RESERVED (Invalid value)
2:0	BDR	0	RW	Baud Rate 0: 115200 bps 1: 57600 bps 2: 38400 bps 3: 19200 bps 4: 9600 bps 5: RESERVED (Invalid value) 6: RESERVED (Invalid value) 7: RESERVED (Invalid value)

Table 77. **PLC Link Slave (Master Modbus Mode) ID (0x900F)**

Bits	Default Value	Access	Description
7:0	1	WR	The Slave ID in master Modbus mode.

Appendix

Field Of View

Focus	Standard Range(SR)
Horizontal Field Angle (degrees)	21.2 ± 3.5∘
Vertical Field Angle (degrees)	16.5 ± 3.5∘
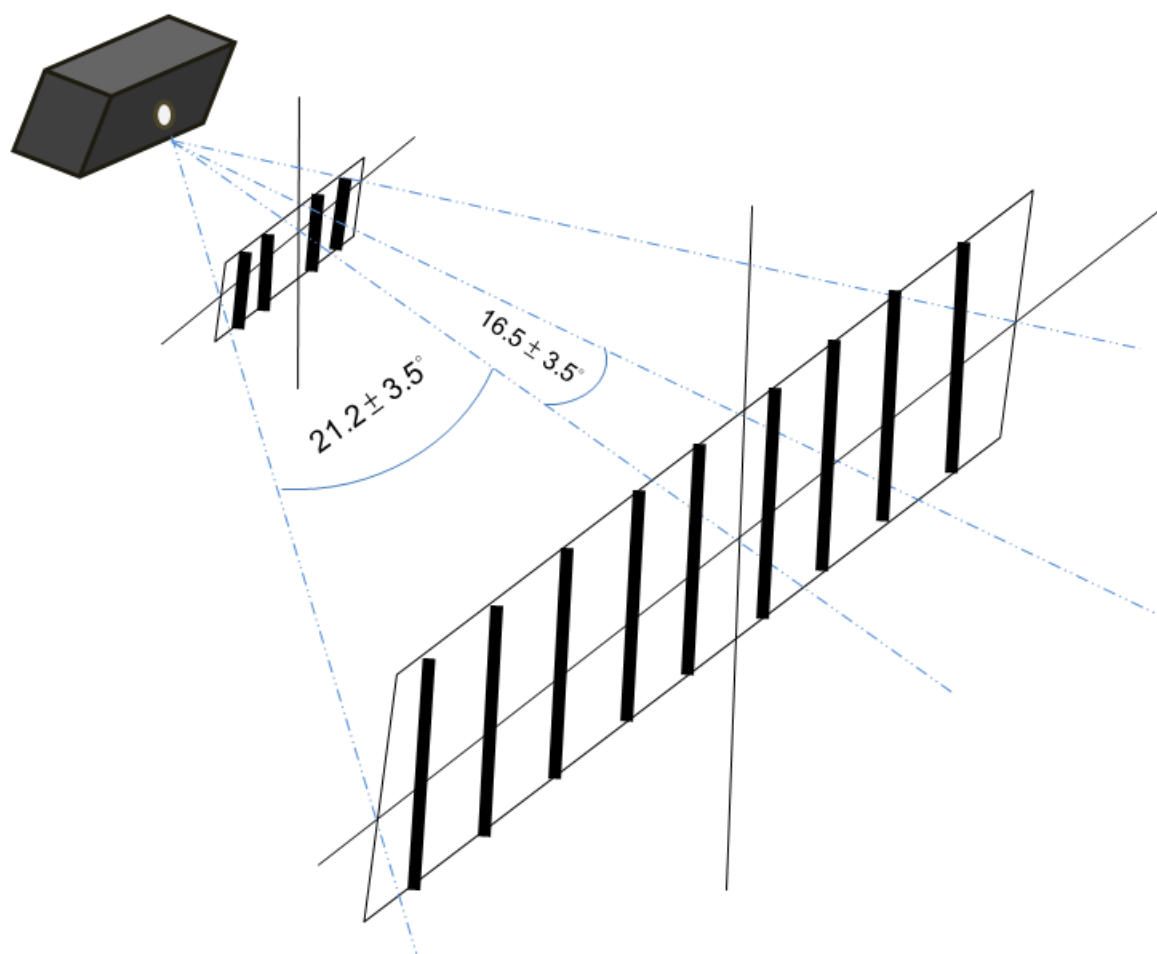
Working Range

Barcode	Working Range
5mil code39	50~140 mm
20mil code39	45~480 mm
13mil EAN/UPC	50~400 mm
6.67mil PDF417	40~180 mm
10 mil Data Matrix	45~140 mm

20mil QR code	45~245 mm

top-down view
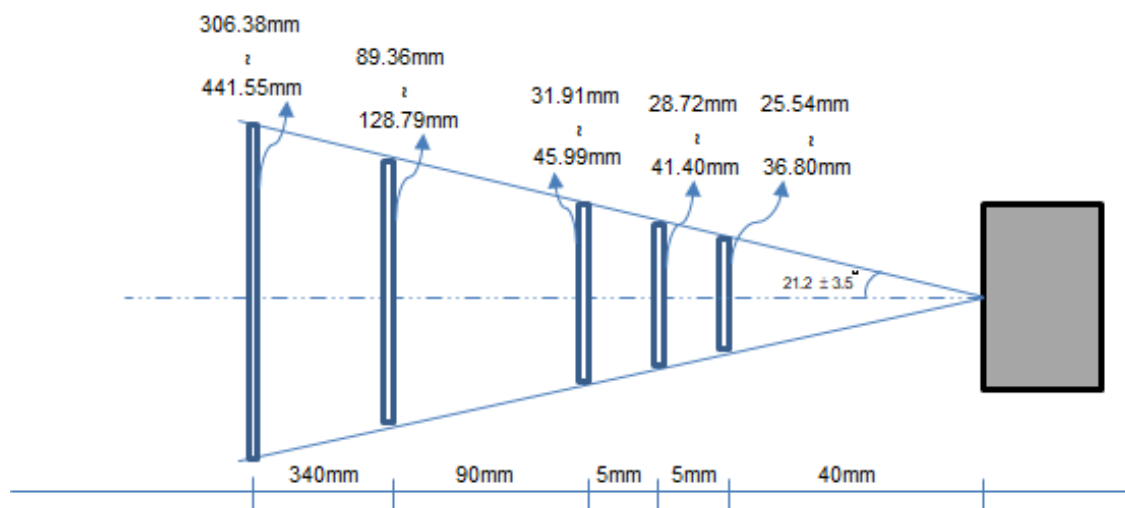
side view
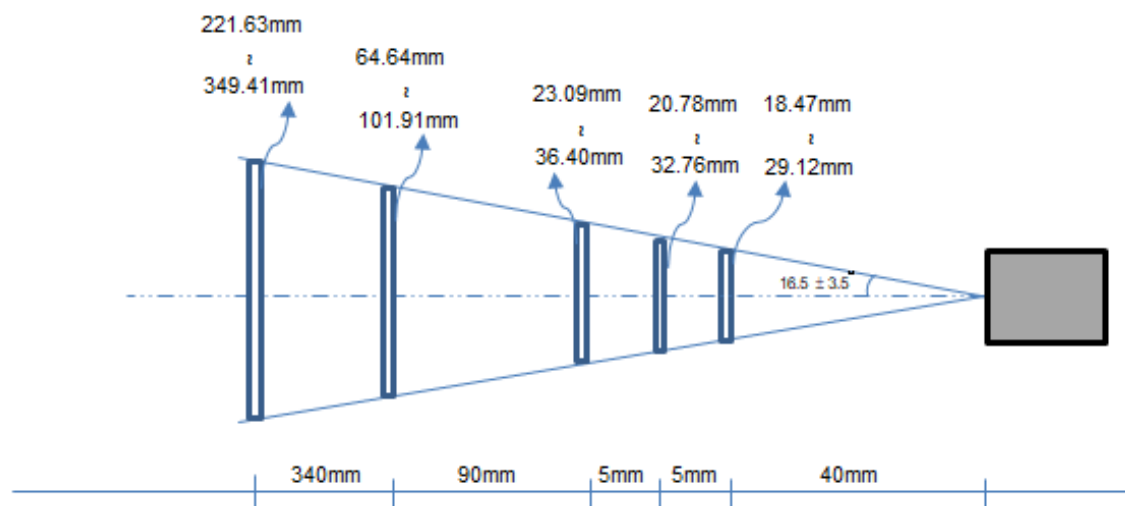
Modbus Exception Code

Code	Name	Meaning
01	ILLEGAL FUNCTION	The function code is not supported
02	ILLEGAL DATA ADDRESS	The data address received in the query is not an allowable address. For a controller with 10 registers, the PDU

		addresses the first register is 0x8001, and the last one as 800A. If a request is submitted with a starting register address of 0x8007 and a quantity of registers of 4, then the request will successfully operate on registers 0x8007, 0x8008, 0x8009, 0x800A.. If a request is submitted with a starting address of 0x8009 and a quantity of registers of 3, then this request will fail with Exception Code 0x02 since it attempts to operate on registers 0x8009, 0x800A and 0x800B, and there is no register with address 0x800B.
03	ILLEGAL DATA VALUE	A value contained in the query data field is not an allowable value. This indicates a fault in the structure of the request, such as that the implied length is incorrect or the value outside the expectation of the application program.
07	ERROR CEHCKSUM	The checksum of request command is error.
09	INVALID TRIGGER	If the trigger command is received in the startup communication period or system is in the busy period. Refer Figure 6. Start-up communication to Scan mode and Figure 14. Valid trigger to create a valid trigger.