INSPEKTO

AUTONOMOUS MACHINE VISION

INSPEKTO S70

Digital I/O integration guide

Contents

ABOUT THIS DOCUMENT **4**

What's in the manual 4
Inspekto S70 4
System Overview 4

SAFETY AND INSTRUCTIONS FOR USE: **5**

Before you begin 5
Tags meaning 5
General safety: 6
Preventing injury: 6
Assembly safety instructions: 6
Electrical safety: 7
Cleaning: 8
Operation and storage: 8

GETTING STARTED **9**

What is in this manual 9
What is in the box 10

DIGITAL I/O INSTALLATION **11**

Digital I/O installation location 11
How to connect 11
Digital I/O Subsystems & Types 12
Controller 12
Input unit 15
Output unit/s 17
SINK Output (NPN) 17
SOURCE Output (PNP) 19
Digital I/O wiring 21

S70 – DIGITAL I/O INTEGRATION **22**

INSPEKTO S70 side 22
Standard Digital I/O 24
PLC -> S70 24
Supported Functions 25
Detailed Function Explanations 26
PLC -> S70 26
Inspection modes detailed explanation: 27
Example: changing inspection mode to Manual. *31*
Example: Change inspection mode to "Direct trigger – Part ID provided by the PLC" *33*
Example: sending a trigger command with Part ID = 810 when the system is set to inspection mode Auto – part ID provided by the PLC and inspection result = Pass. *36*
Example: Sending a trigger command with Part ID = 5 and result is FAIL, with defects in ROI 1 and 4 *38*
Example: loading profile with connectivity ID "7" *42*
Example: Load profile with integration ID that does not exist in the system (ID=19) *44*
Example: start a new batch with batch ID "38" *47*
S70 -> PLC 49
Example: Result per ROI 51

S70 INTEGRATION - DISCRETE DIGITAL I/O **52**

PLC to S70 *52*
S70 to PLC *52*

7. SIGNAL FLOW CHARTS **55**

8. USING THE INSPEKTO S70 CONNECTIVITY FEEDBACK INTERFACE 56

S70 -> PLC SCREEN: 58
PLC -> S70 SCREEN: 59

9. INFORMATION AND INSTRUCTIONS 60

6.1 DISPOSAL OF EQUIPMENT 60
6.2 CE STATEMENT 60
6.3 RMA 60

About this document

What's in the manual

This document details the steps needed in order to integrate the S70 with a PLC using the Digital I/O module.
The Inspekto S70 has 2 modes of operation with the digital I/O module:

1. Digital I/O – in this mode the commands and responses between the PLC and the S70 are encrypted in a binary code. The digital I/O module is defined to have command bits and detail bits as detailed in this document in item 5.
2. Discrete Digital I/O – in this mode each input and output line has a single purpose (commands for inputs going in to the S70 (PLC-> S70) and responses for outputs going out of the S70 (S70->PLC))

Choosing between the two methods should be done according to the usage and level of details needed, this document describes both methods and the differences between them

Inspekto S70

Powered by the Autonomous Machine Vision Artificial Intelligence (AMV-AI) technology, the INSPEKTO S70 Gen. 2 allows easy fit into dynamic and versatile production environments for a wide range of use cases, while maintaining superb visual inspection quality. It is the only self-contained vision inspection product on the market and represents the most user-friendly solution for industrial quality inspection currently available. It can be set up and deployed by the final user in about 45 minutes and can be trained to inspect new products using an average of only 20 good sample items, and no defective ones.

System Overview

The Inspekto S70 Gen. 2 is installed on the production line and after a simple and short setup process, it captures images of the manufactured items using its vision system.
The captured image of the inspected item is compared with the good references, using AI capabilities and if there are any defects, the Inspekto S70 will present them. The inspection searches for physical abnormalities, which exceed the shape tolerances and surface variations visible in the reference items. The system will only present true defects, not those that can be explained by other phenomena, such as changes to lighting or movement. The AMV-AI technology is highly sensitive to details and identifies even minor differences between defects and permissible variations.
If the inspected item is defective, the S70 communicates to the PLC The images contain a timestamp and a running counter of the items, which can be used to track back any items inspected.

Document Number S70-DOC-0016
Revision 001 October 2022
Copyright©2017 INSPEKTO™ A.M.V. LTD All rights reserved.
All copyrights in this manual, and the hardware and software described in it, are the exclusive property of INSPEKTO™ A.M.V. LTD
INSPEKTO™
Information: info@inspekto.com
Support: support@inspekto.com
Web: http://www.inspekto.com
Zeev Zabotinsky St 7, Ramat Gan, 5252007, Israel

Safety and instructions for use:

Please read the following warnings and application instructions carefully.

Before you begin

Before you begin using this product, or any installation or service operation, please read the following safety information.

Attention to these warnings will help prevent personal injuries and damage to the products.

It is your responsibility to use the product in an appropriate manner. This product is designed for use in production environments and must not be used in any way that may cause personal injury or property damage.

You are responsible if the product is used for any intention other than its designated purpose or in disregard of INSPEKTO instructions. INSPEKTO shall assume no responsibility for such use of the product.

The product is used for its designated purpose if it is used in accordance with its product documentation and within its performance limits.

Using the product requires technical skills and a basic knowledge of English. It is therefore essential that only skilled personnel be allowed to use the product.

Keep the basic safety instructions and the product documentation in a safe place and pass them on to the subsequent users.

Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed.

Tags meaning

The following signal words are used in the product documentation to warn about risks and dangers.



Indicates a hazardous situation which, if not avoided, could result in death or serious injury







Indicates that information related to safety or system proper information is provided

General safety:

- The system is designed for indoor use only.
- Installation and service must comply with all local codes and rules in order to maintain your warranty.
- Avoid pointing Vision Sensor lens at very bright objects (for example, light fixtures) for extended periods of time.

Preventing injury:

- Strictly avoid looking directly into the light source.
- The Vision Sensor (lighting & camera) and Digital I/O module must be unplugged from the power supply before installation or during maintenance.
- The device must not be used when a failure may cause personal injury.

Assembly safety instructions:

⚠WARNING

S70 Controller ventilation should not be obstructed.
Make sure to allow airflow through the ventilation.
If proper ventilation is not provided it can result an electric shock, fire and/or serious personal injury or death.

⚠WARNING

S70 Digital I/O module is designed and should be installed on a DIN rail in an enclosed cabinet. Connection of the unit to the electric outlet should be done by a certified electrician.

⚠WARNING

Product overheating can cause electric shock, fire and/or serious personal injury or death.
If the controller or the Vision Sensor or any other part of the system is overheating, turn it off, disconnect it from power and contact support.

NOTICE

- Following are the required operating position and conditions:
- Caution should be taken when assembling the system at the inspection location and attention should be paid to the safety instructions for the specific production line or manufacturing station
- The production line should be fully disabled during installation to prevent injury
- Never turn on or connect to power any equipment when there is evidence of mechanical damage, fire, exposure to water, or structural damage.
- Do not place the product on surfaces, vehicles, cabinets, or tables that for reasons of weight or stability are unsuitable for this purpose.
- Make sure to follow the assembly instructions of the Inspekto S70 DI/O module as described in this document.
- Do not place the product on heat-generating surface or near heat emitting devices such equipment racks or heaters. Verify that there is sufficient clearance between the product and any other system that may exhaust warm air.
- The product operating ambient range is temperature of 10 to 38 °C (50 to 100 °F) and Relative humidity of 20-80%. It is recommended to be used at an ambient temperature of 20 to 25 °C (68 to 77 °F) and ensure relative humidity of 30-50% is maintained during normal operation as this will result in better performance and longer MTBF of the equipment. Temperature must not exceed the maximum temperature specified above.
- The product is for indoor use only.
- The product is for use in pollution degree 2 environment.
- A tolerance of ±10 % shall apply to the nominal input voltage and ±3 % to the nominal frequency, overvoltage category 2.
- Maximum operating altitude is 2,000 m asl.

Electrical safety:

⚠ DANGER

The following information on electrical safety must be observed, failing to follow these instructions may result in electric shock, fire and/or serious personal injury or death.

- Prior to powering ON the product, always ensure that the nominal voltage setting on the product matches the nominal voltage of the AC supply network.
- This product should be connected to the power mains using a 3-wire (two conductors and ground) power cable and plug. Use this power cable with a properly grounded electrical outlet to avoid electrical shock.
- If extension cords or connector strips are implemented, they must be checked on a regular basis to ensure that they are safe to use.
- The plug of the connecting cable is regarded as the disconnecting device. In such cases, always ensure that the power plug is always easily reachable and accessible (corresponding to the length of connecting cable, approx. 2 m).
- Never use the product if the power cable is damaged. Check the power cable on a regular basis to ensure that it is in proper operating condition. By taking appropriate safety measures and carefully laying the power cable, you can ensure that the cable will not be damaged and that no one can be hurt by, for example, tripping over the cable or suffering an electric shock.

- Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket. Otherwise, sparks that result in fire and/or injuries may occur.
- Do not use power supplies other than those provided.
- Do not overload any sockets, extension cords or connector strips; doing so can cause fire or electric shocks.
- Ensure that the connections with information technology equipment, e.g. PCs or other industrial computers, comply with the IEC60950-1/EN60950-1 or IEC61010-1/EN 61010-1 standards that apply in each case.
- Unless expressly permitted, never open the controller enclosure or any part of the Vision Sensor housing or the DI/O module while the product is in operation. Doing so will expose circuits and components and can lead to injuries, fire or damage to the product.
- Use suitable overvoltage protection to ensure that no overvoltage (such as that caused by a bolt of lightning) can reach the product. Otherwise, the person operating the product will be exposed to the danger of an electric shock.
- The overvoltage protection should limit the magnitude of the overvoltage surge to 1kV between the any of the power line and ground.
- The product is not liquid proof; therefore, the equipment must be protected against penetration by liquids. If the necessary precautions are not taken, the user may suffer electric shock or the product itself may be damaged, which can also lead to personal injury.
- Never use the product under conditions in which condensation has formed or can form in or on the product, e.g. if the product has been moved from a cold to a warm environment. Penetration by water increases the risk of electric shock.
- Prior to cleaning the product, disconnect it completely from the power supply. Use a soft, non-lining cloth to clean the product. Never use chemical cleaning agents such as alcohol, acetone or diluents for cellulose lacquers.

Cleaning:

- The light emission surface must be cleaned with a standard glass cleaner solution and a soft cleaning cloth only.
- The camera lens must be cleaned with the provided lens cleaning cloths (or similar) only.
- Do not apply benzene, gasoline, or thinner to the imaging unit or any other part of the system, as these may melt the surface of the unit or cause fogging of the lens.

Operation and storage:

- Following are the required operating and storage conditions:
- **⚠CAUTION**
- Never turn ON or connect to power any equipment when there is evidence of mechanical damage, fire, exposure to water, or structural damage.
- Avoid operating or storing the product in the following conditions: Extremely humid, dusty, or hot/cold environments; Close to sources of powerful radio or TV transmitters; under unstable or flickering light sources.
- Operating the product requires sufficiently skilled personnel. It is the responsibility of the employer/operator to select suitable personnel for operating the product.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- Never stare directly at the LED lights.
- Never use the product in a moving vehicle.

Getting started

What is in this manual

This manual describes how to establish industrial communication between the S70 system to the PLC using the Digital I/O interface. The Digital I/O module connects to the S70 system using Ethernet cable, using a designated port. The ports are located at the Controller back, and the rightmost port should be connected to the Digital I/O module.

The S70 has 2 modes of operating with the I/O module:

1. Digital I/O.
2. Discrete Digital I/O.



What is in the box

The INSPEKTO S70 Digital I/O module is provided with the following parts and components as shown in Table 1:

Table 1: Parts and components of Inspekto S70 Digital I/O module system

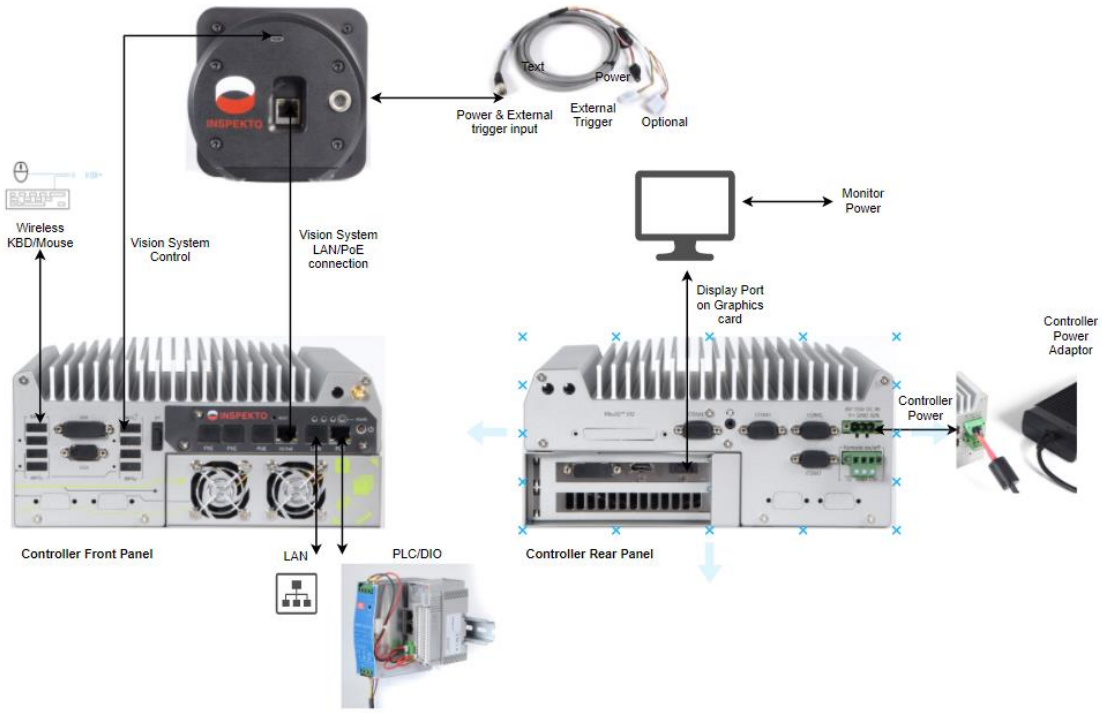
Part name	Guide ID	P/N	Image	Quantity
Digital I/O kit Source Output (GT-226F)	A	S70-ACC-0018		1
Or:				
Digital I/O Kit Sink Output (GT-225F)	B	S70-ACC-0019		1
One of the following power cables:				
EU power cable*	K2	S70-CAB-0001		1
UK power cable*	K2	S70-CAB-0008		**1**
US power cable*	K2	S70-CAB-0007		**1**
IL power cable*	K2	S70-CAB-0004		**1**
LAN Cable		S70-CAB-0009		**1**
* Power supply cables are supplied according to your region				

Digital I/O Installation

Digital I/O installation location

Digital I/O module is designed to be installed in an industrial cabinet located next to the PLC and the Inspekto controller. As such, the Digital I/O module is provided with a DIN rail.

How to connect



Above is a block diagram of the Inspekto solution. Of special note is the connection of the Inspekto controller to the Digital I/O module controller (labelled “PLC/DIO” in the drawing) via an RJ45 network cable. Digital output signals are to be connected to the Digital inputs of the PLC and the Digital output signals of the PLC are to be connected to the Digital inputs of the Inspekto DI/O module. Input #1 on the Inspekto Digital inputs to output #1 in the PLC Digital outputs. Pin 2 to pin 2 and so on.

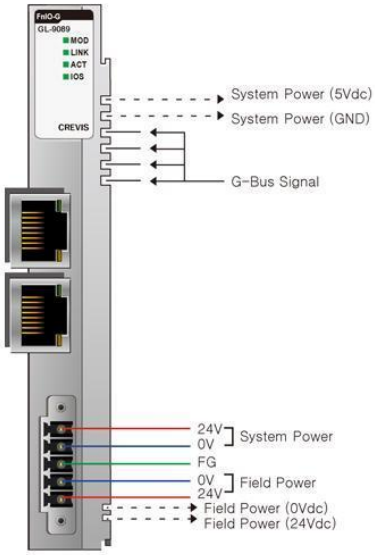
Digital I/O Subsystems & Types

Inspekto has defined and tested a set of Digital I/O module for connection to the PLC. Units are comprised of a network Controller, Digital Input unit (universal for both SINK(NPN) and SOURCE(PNP) PLC outputs), and Digital output unit, either SINK or SOURCE type for connection to the PLC inputs. Inspekto has selected CREVIS as the supplier of this solution. The module also includes a 24VDC power supply with a universal AC power input. Following are specifications of each of the units.

Controller

GL-9089

MODBUS TCP/UDP NETWORK ADAPTER



Interface Specification,

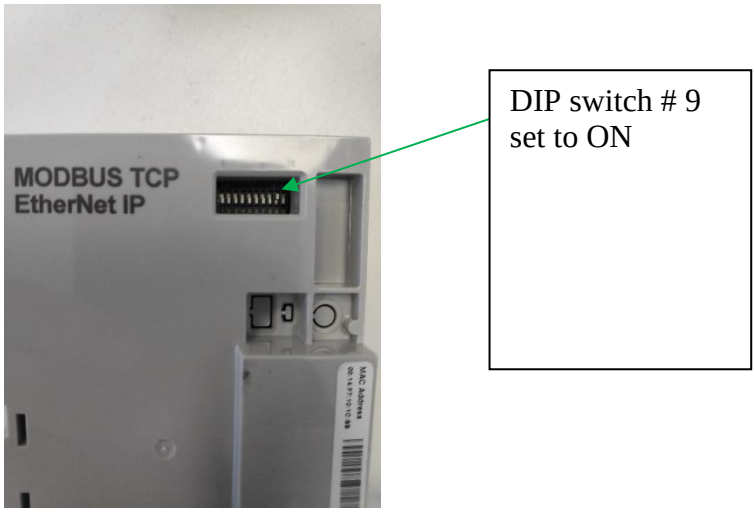
- Adapter Type: Slave node (MODBUS/TCP, MODBUS/UDP Server)
- Protocol: MODBUS/TCP, MODBUS/UDP, HTTP, DHCP,10 TCP Connections
- Sub-Protocol: Ethernet/IP
- Max. Expansion Module: 16 slots
- Max. Input/output Data Size: Max. Input 256 bytes / Output 256 bytes
- Max Length: Bus Line: Up to 100m from Ethernet Hub/Switch with twisted CAT5 UTP/STP
- Max. Nodes: Limited by Ethernet Specification.
- Baud Rate: 100Mbps, Auto-negotiation, Full duplex
- Interface Connector: RJ-45 socket * 2pcs
- IP-Address Setup: Via DHCP/BOOTP or I/O Guide (Crevis Software)
- IP-Address Range: xxx.xxx.xxx.1 ~ 253 (User area) xxx.xxx.xxx.254 ~ 255 (Reserved for IAP Function)
- IAP Mode: When DIP Switch 1 to 8 setting is 254 or 255

- Indicator : 4 LEDs
  - 1 Green/Red, Module Status (MOD)

    - 1 Green, Physical Connection (LINK)
    - 1 Green, Exchange Data/Traffic Present (ACTIVE)
    - 1 Green/Red, Expansion I/O Module Status (IOS)
    - 2 LEDs (each RJ45 Connector)
    - 1 Yellow, Link/Active
    - 1 Green, Not used
- Module Location: Starter module left side of G-Series system
- General Specification
    - Supply voltage: 24Vdc nominal, Class2
    - System Pwr Supp. voltage: 24Vdc nominal
    - Supply voltage range: 15~28.8Vdc
    - Protection: Reverse polarity protection
    - Power Dissipation: 75mA typical @ 24Vdc
    - Current for I/O Module: 1.0A @ 5Vdc
    - Isolation: System power to internal logic: Non-isolation
    - System power I/O driver: Isolation
    - UL Field Power: Supply voltage: 24Vdc nominal, Class2
    - Field Power: Supply voltage: 24Vdc typical (Max. 30Vdc)
    - Max. Current Field Power Contact: DC 8A Max
    - Wiring: I/O Cable Max. 2.0㎟ (AWG 14)
    - Torque: 0.8Nm (7 lb-in)
    - Weight: 76g
    - Module Size: 22mm x 109mm x 70mm
    - Environment Condition: Refer to ‘1. Environment Specification’
    - Pin No: Signal Description
        - 1 System Power, 24V
        - 2 System Power, Ground
        - 3 F.G
        - 4 Field Power, Ground
        - 5 Field Power, 24V

DIP Switch setup

On the side of the controller there is a DIP switch array of 10 switches. The INSPEKTO S70 Digital I/O module is shipped with the correct configuration, DIP switch #9 is set to ON while all other switched are set to OFF. Below is an image of the DIP switch with the correct setting.



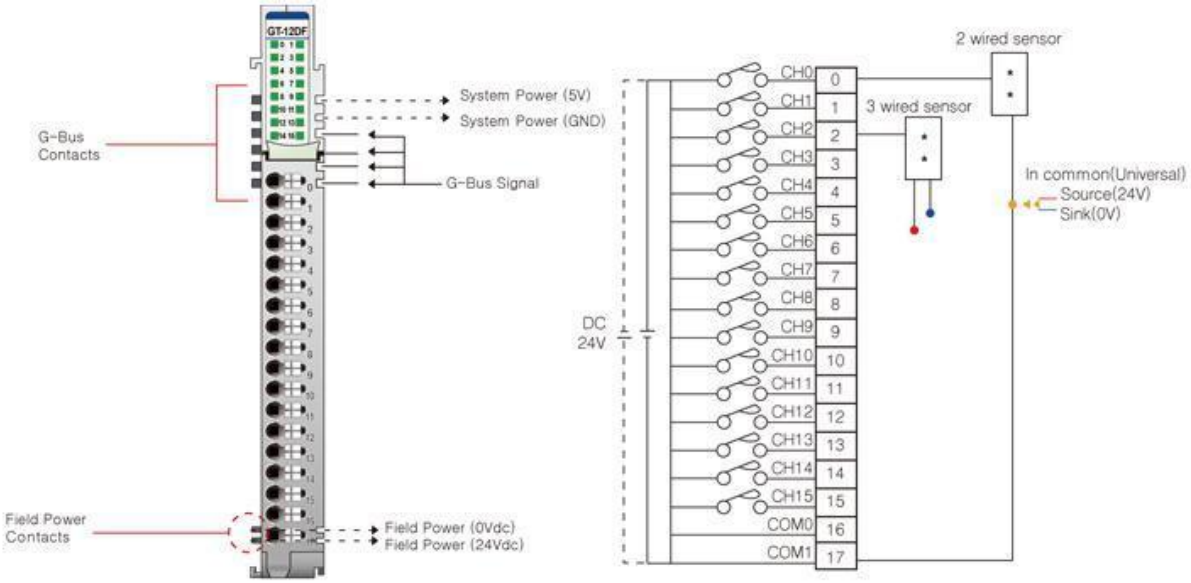
Input unit

GT-12DF

16 Channels Universal (Sink or Source) Input Terminal

- Inputs per module: 16 Points Universal Digital Type
- Indicators: 16 Green input state
- ON–state Voltage: 24V dc nominal
  - @70℃ - Min. 15Vdc to Max. 28.8Vdc
  - @60℃ - Min. 15Vdc to Max. 32Vdc
- ON-state current: 3.05mA maximum/point @32Vdc
- Input Signal Delay : OFF to ON: 0.3ms Max
  - ON to OFF: 0.3ms Max
- Nominal Input Impedance: 14.9K ohm typical
- COMMON Type: 16 points / 2 COM (Single Common)
- General Specification
  - Power dissipation : 50mA maximum @ 5.0Vdc
  - Isolation: I/O to Logic: Photocoupler isolation
  - Field Power: Supply voltage: 24Vdc nominal
  - Voltage range: 15~32Vdc
  - Power dissipation: 0mA @ 32Vdc
  - Wiring: I/O Cable Max. 0.75mm² (AWG 18)
  - Weight: 63g
  - Module Size: 12mm x 109mm x 70mm

Pin No.	Signal Description	Pin No.	Signal Description
0	Input Channel 0	1	Input Channel 1
2	Input Channel 2	3	Input Channel 3
4	Input Channel 4	5	Input Channel 5
6	Input Channel 6	7	Input Channel 7
8	Input Channel 8	9	Input Channel 9
10	Input Channel 10	11	Input Channel 11
12	Input Channel 12	13	Input Channel 13
14	Input Channel 14	15	Input Channel 15
16	Common (SinkOper.0V /Source Oper.24V)	17	Common (SinkOper.0V /Source Oper.24V)



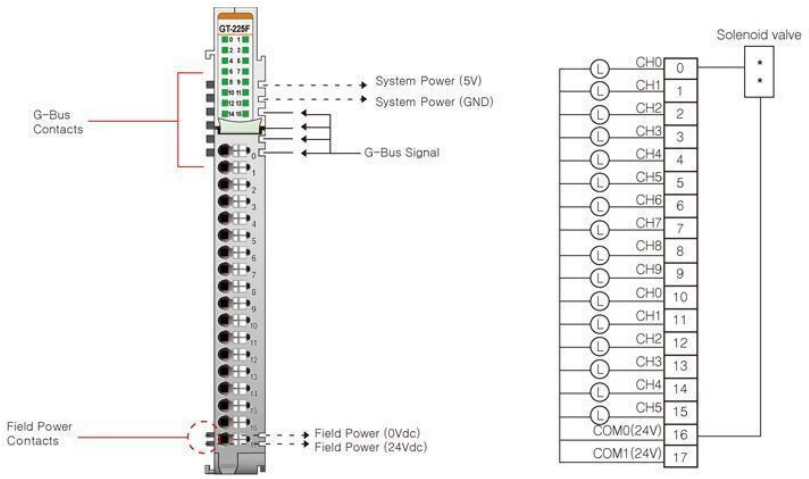
Output unit/s

There are two types of connections of output units, SINK output, also known as NPN or SOURCE output which is also known as PNP. Identifying the correct output type must be done prior to ordering the DI/O set from Inspekto, consult your onsite production line integration engineer for the required type.

SINK Output (NPN)

GT-225F

16 Channels, Sink Output Terminal, 24Vdc/0.3A



GT-225F Specification

- Output per module: 16 Points Sink type
- Indicators: 16 Green output state
- Output Voltage Range: Nominal 24Vdc, Min. 15Vdc ~ Max. 32Vdc
- ON-state voltage drop: Max. 0.3Vdc @ 25℃ / 0.5Vdc@ 70℃
- ON-State Min. Current: 1mA per channel
- OFF-State Leakage current Max. 20uA
- Output Signal Delay: OFF to ON: 0.3mS maximum
- ON to OFF: : 0.5mS maximum
- Output Current Rating: Max. 0.3A per channel / Max. 4.8A per unit
- Protection
  - (VNS3NV04D-E): Over Current limit: Min. 3.5A@ 25℃ per each channel (VNS3NV04D-E)
- Thermal Shutdown: : Min 3A@ 25℃ per each channel (VNS3NV04D-E, Min 150℃)
- Short circuit protection
  - COMMON Type: 16 points / 2COM
- General Specification
  - Power dissipation: 50mA maximum @ 5.0Vdc
  - Isolation: I/O to Logic: Photocoupler isolation
  - Field Power: Supply voltage: 24Vdc nominal

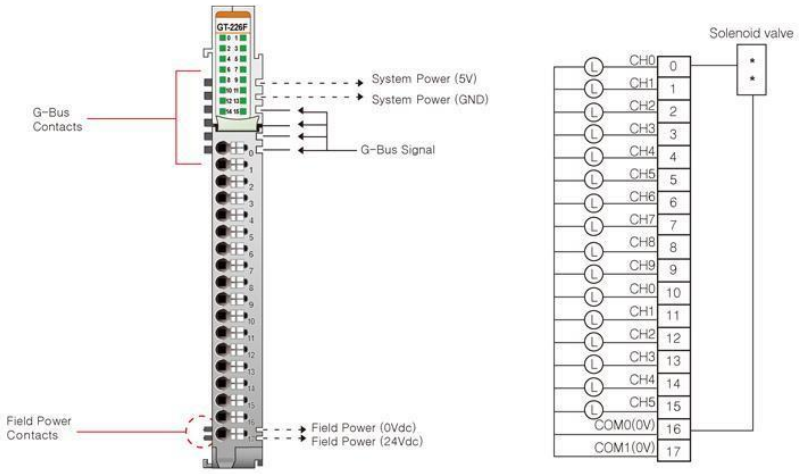
- Voltage range: : 15~32Vdc
- Power dissipation: : 30mA maximum @ 32.0Vdc
- Wiring: I/O Cable Max. 0.75mm²(AWG 18)
- Weight: 63g
- Module Size: 12mm x 109mm x 70mm

Pin No.	Signal Description	Pin No.	Signal Description
0	OutputChannel 0	1	OutputChannel 1
2	OutputChannel 2	3	OutputChannel 3
4	OutputChannel 4	5	OutputChannel 5
6	OutputChannel 6	7	OutputChannel 7
8	OutputChannel 8	9	OutputChannel 9
10	OutputChannel 10	11	OutputChannel 11
12	OutputChannel 12	13	OutputChannel 13
14	OutputChannel 14	15	OutputChannel 15
16	Common (Field Pwr. 24V)	17	Common (Field Pwr. 24V)

SOURCE Output (PNP)

GT-226F

16 Channels, Source Output Terminal, 24Vdc/0.3A



- GT-226F : (16 Channels Source Output Terminal)
- Output per module: 16 Points Source type
- Indicators: 16 Green output state
- Output Voltage : Range Nominal 24Vdc, Min. 15Vdc ~ Max. 32Vdc
- ON-state voltage drop: Max. 0.3Vdc @ 25℃ / 0.5Vdc@ 70℃
- ON-State Min. Current 1mA per channel
- OFF-State Leakage current Max. 5uA
- Output Signal Delay: OFF to ON: 0.3mS maximum
- ON to OFF: : 0.3mS maximum
- Output Current Rating Max. 0.3A per channel / Max. 4.8A per unit
- Protection
  - Over Current limit: Min 6.5A@ 25℃ per each channels (ITS716G)
  - Thermal Shutdown: Min 4A@ 25℃ per each channel (ITS716G, Min 150℃)
- Short circuit protection
  - COMMON Type: 16 points / 2COM
- General Specification
  - Power dissipation: 50mA maximum @ 5.0Vdc
  - Isolation: I/O to Logic: Photocoupler isolation
  - Field Power: Supply voltage: 24Vdc nominal
  - Voltage range: 15~32Vdc
  - Power dissipation: 40mA maximum @ 32.0Vdc
  - Wiring: I/O Cable Max. 0.75mm²(AWG 18)
  - Weight: 63g
  - Module Size: 12mm x 109mm x 70mm

Pin No.	Signal Description	Pin No.	Signal Description
0	OutputChannel 0	1	OutputChannel 1
2	OutputChannel 2	3	OutputChannel 3
4	OutputChannel 4	5	OutputChannel 5
6	OutputChannel 6	7	OutputChannel 7
8	OutputChannel 8	9	OutputChannel 9
10	OutputChannel 10	11	OutputChannel 11
12	OutputChannel 12	13	OutputChannel 13
14	OutputChannel 14	15	OutputChannel 15
16	Common (Field Pwr. 0V)	17	Common (Field Pwr. 0V)

Digital I/O wiring

⚠CAUTION

Please note - electrical wiring should be done by a certified electrician only.

Digital I/O module wiring should be performed as follows:

- Make sure system/s are turned off and disconnected from the AC power outlet.
- Make sure you have the correct units. i.e. SINK(NPN) or SOURCE(PNP) based outputs as per the PLC requirements
- Mount the DI/O module in the cabinet
- Connect DI/O module outputs to PLC inputs
- Connect PLC outputs to DI/O module inputs
- Connect the D/IO common inputs and outputs according to your application need.
    - i.e. if working with an NPN PLC, common output (output 16/17) should be connected to PLC +24VDC.
- Connect the Inspekto controller PLC output to the DI/O module Controller (RJ45 connections).
- Make sure that the wiring of the universal AC input to the 24VDC power supply is correct; Line, Neutral, and Ground (this connection should be done by a certified electrician).
- Power up the units.

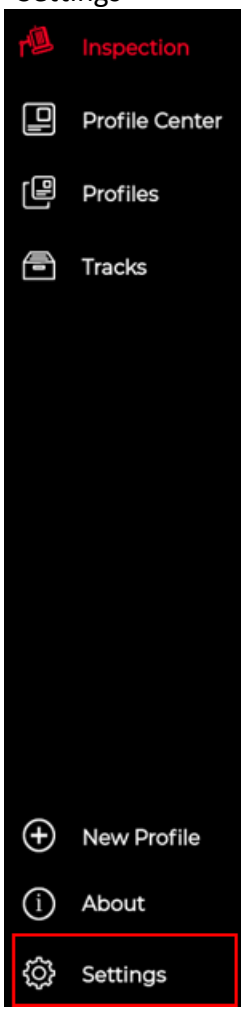
S70 – Digital I/O Integration

Digital I/O has two modes of operation: Standard Digital I/O, and Discrete Digital I/O.
In Standard Digital I/O each command and response is encoded in a binary code, as detailed below.
In Discrete Digital I/O each input and output line has a single purpose (commands for inputs going in to the S70 (PLC-> S70) and responses for outputs going out of the S70 (S70->PLC))

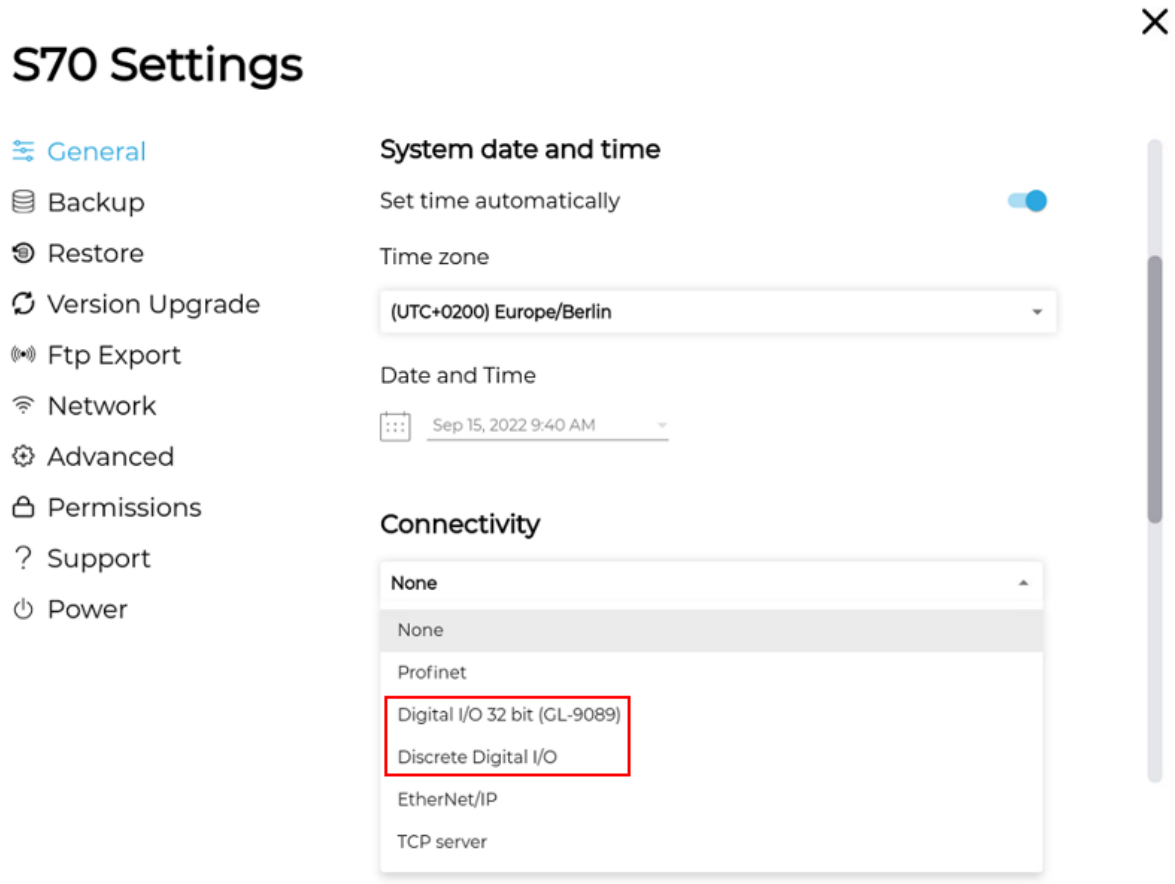
- In the system user interface Standard Digital I/O is described as “Digital I/O 32bit (GL-9089)”
- **All signals coming from the PLC to the Inspekto S70 must be in pulses.**
  - Minimum pulse width – 50mSec

INSPEKTO S70 side

In the S70 screen hover over the left side of the screen so the menu will open, and press on “Settings”



Under General tab – scroll down to “Connectivity” section. From the drop down menu, choose either “Digital I/O 32 bit (GL-9089)” or “Discrete Digital I/O”, according to your need.



- Once selected, the INSPEKTO S70 will automatically work with the Digital I/O module in the selected method (assuming the Digital I/O module is connected to the INSPEKTO S70 system as detailed above).
- When connected and set properly, once there is a communication established the “ACT” led in the controller unit (GL-9089) will start blinking rapidly:



Standard Digital I/O

PLC -> S70

The PLC to S70 bits distribution is divided to 3 groups:

1. Request Type – specifies the command type that is sent from the PLC to the S70.
2. Request Value – specifies the details of the command (when applicable)
3. Set Bit - The “Set Bit” (bit 15) is used to let the INSPEKTO S70 know that the next command is ready to be performed. In order for the system to react to a command the PLC should set the “Set Bit” to “1”.
    - “Set Bit” must be the last bit that is updated by the PLC. Any other situation might cause for a miss-interpretation of the command by the INSPEKTO S70.

- See detailed explanations below.



15(MSB)	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Set Bit	Request Type					Request Value									

Supported Functions

Function	Direction	Relevant Bits	Explenation
OUT_INSPECTION_MODE	PLC -> S70	Output 10-14	Sets the system's triggering mode.
OUT_NEW_OBJECT_TRIGGER	PLC -> S70	Output 10-14	Sets a new inspection trigger
OUT_PROFILE_ID	PLC -> S70	Output 10-14	Load inspection profile with profile connectivity ID XX
OUT_BATCH_ID	PLC -> S70	Output 10-14	Start a new batch with batch ID XX
IN_SYSTEM_READY	S70 -> PLC	Input 15	report whether the system is ready to receive a new command or not
IN_SYSTEM_ERROR	S70 -> PLC	Input 14	report an error in case there is one, values may differ given the error state and the command that was sent to the INSPEKTO S70
IN_OBJECT_INSPECTION_RESULT	S70 -> PLC	Input 12-13	Report the last inspection cycle result
IN_RESPONSE_STATUS	S70 -> PLC	Input 11	a bit to acknowledge that an OUT command has been performed
IN_RESPONSE_VALUE	S70 -> PLC	Input 0-10	a set of bits detailing the values of an IN response

Detailed Function Explanations

PLC -> S70

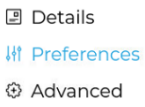
Request Types

		bit				
		14	**13**	**12**	**11**	**10**
command	**OUT_INSPECTION_MODE**	0	0	0	0	1
	OUT_NEW_OBJECT_TRIGGER	0	0	0	1	0
	OUT_PROFILE_ID	0	0	0	1	1
	OUT_BATCH_ID	0	0	1	0	0

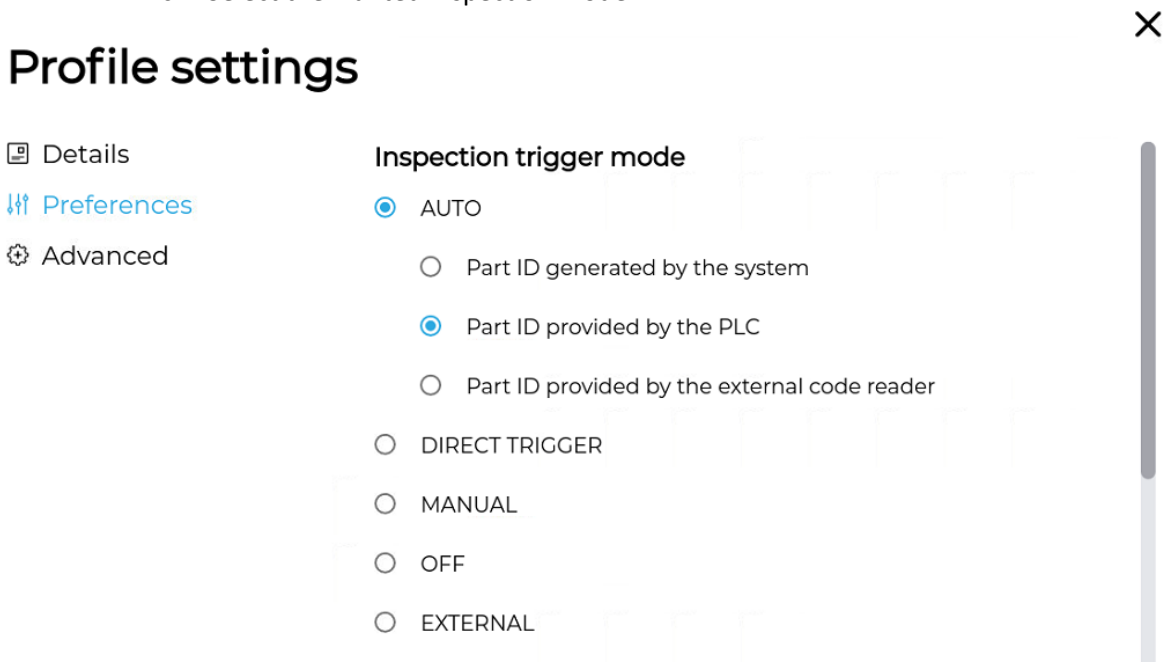
1. OUT_INSPECTION_MODE
   Inspection mode controls the INSPEKTO S70's trigger mode out of the following available options:

Inspection modes	Decimal Value	Binary Value bit									
		9	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
OFF	0	0	0	0	0	0	0	0	0	0	0
Auto - Part ID provided by the PLC	1	0	0	0	0	0	0	0	0	0	1
Auto - Part ID generated by the system	2	0	0	0	0	0	0	0	0	1	0
Manual	3	0	0	0	0	0	0	0	0	1	1
External - Part ID generated by the system	4	0	0	0	0	0	0	0	1	0	0
External - Part ID provided by the PLC	5	0	0	0	0	0	0	0	1	0	1
Direct Trigger - Part ID generated by the system	6	0	0	0	0	0	0	0	1	1	0
Direct Trigger - Part ID provided by the PLC	7	0	0	0	0	0	0	0	1	1	1
Auto - Part ID generated by the external code reader	8	0	0	0	0	0	0	1	0	0	0

- Users can also modify inspection modes using the system user interface by going to profile settings -> Preferences.
  - In the system, while profile is loaded, press on the  icon in the top left corner of the screen.
  - Select "Preferences" tab:



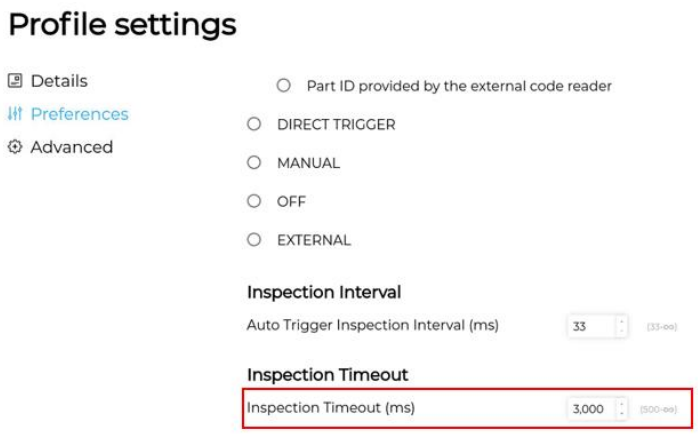
- Select the wanted inspection mode:



- Please note – the order in which trigger modes appear in the user interface is different from the associated value needed when using connectivity.

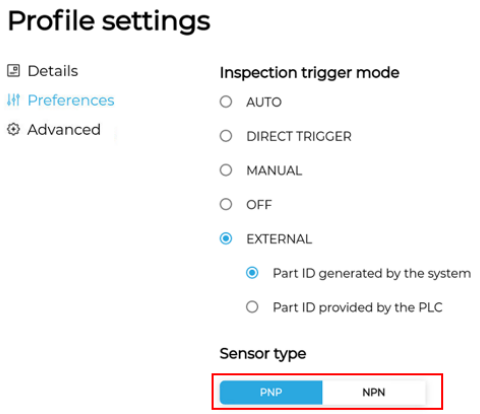
Inspection modes detailed explanation:

- **OFF** – in this mode the system will not respond to trigger signals and will not perform inspections. Use this mode if the system should not be active.
- **Auto – Part ID provided by the PLC** – in this mode the system will automatically identify the part for inspection, wait until it is stationary, and without vibrations and will perform the inspection.
  - In order to enable the system to identify the part the PLC needs to send a **new** part ID that will be assigned to the inspection image. If a new part ID will not be sent, a new inspection will **not** take place.
  - When using this option users should set “Inspection Timeout” that will fit to the line restrictions. Once a trigger signal has been sent, and a part was not identified before the timeout has been reached, the system will issue an “Alert” result stating “No Part Detected”.
    - It is recommended that the PLC will treat “Alert” result as NOK.
    - In order to set “Inspection Timeout”: in the inspection modes screen, scroll down and set the wanted value (minimum value is 500mSec)



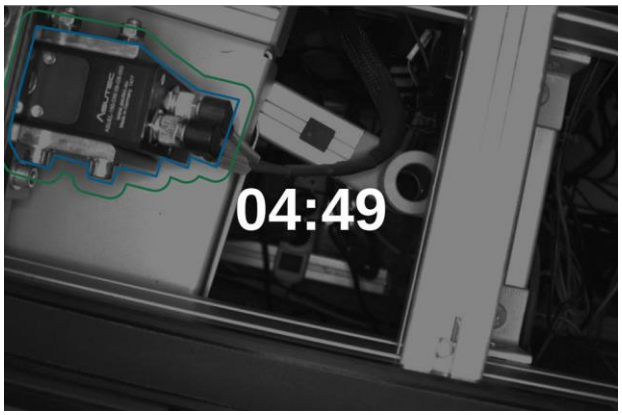
- **Auto – Part ID generated by the system** - in this mode the system will automatically identify the part for inspection, wait until it is stationary, and without vibrations and will perform the inspection.
  - In this mode there is no need to send a trigger signal from the PLC, the system will trigger automatically and assign a unique part ID to the inspection image.
- **Manual** – when selecting this mode, an "Inspect" button will appear in the center bottom of the screen: 

in this mode the only ways to start a new inspection are to manually press the "Inspect" button, or the keyboard "Space" key.
- **External – Part ID generated by the system** – this mode requires connection of an industrial sensor (i.e. photoelectric sensor) directly into the system's power cable using the dedicated connector (see system installation manual for more details). A new inspection will be triggered when the connected sensor will issue a 24VDC signal.
  - in this mode there is no need to send a trigger signal from the PLC, the system will trigger automatically once a signal is issued from the external sensor.
- **External – Part ID provided by the PLC** - this mode requires connection of an industrial sensor (i.e. photoelectric sensor) directly into the system's power cable using the dedicated connector (see system installation manual for more details). In order to start a new inspection, the PLC needs to send a **new** part ID that will be assigned to the inspection image.
  - **The system will react to the connected external sensor signal only after receiving a new part ID from the PLC**, the received part ID will be assign to the inspection image**.**
  - Comments for External inspection modes (applies to External – Part ID generated by the system, **and** External – Part ID provided by the PLC):
    - When selecting this inspection mode, it is also required to specify whether the connected sensor is of type PNP/NPN. In order to set the sensor type - in the inspection modes screen, scroll down and select the wanted type:

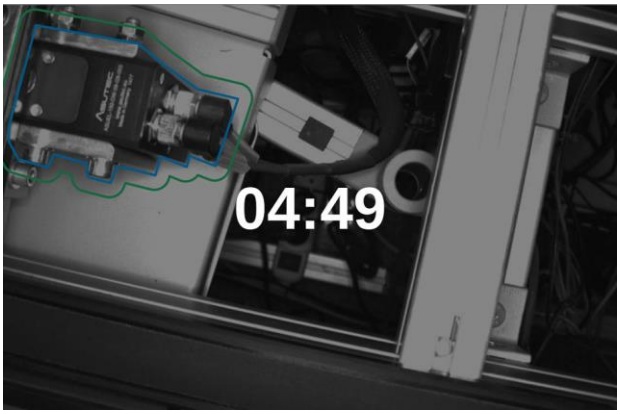


- This selection option will appear in the menu only after selecting "External – XXX" inspection mode.

- When selecting External trigger inspection mode, the system will not show a live video stream. Instead, the system will present a timer stating the time passed since the last inspection:



- **Direct Trigger – Part ID generated by the system** – this mode works in the exact same way as "External – Part ID generated by the system", but instead of receiving the trigger signal from an external sensor, it will receive it from the PLC. In order to generate a new inspection cycle the PLC needs to send a new part ID. **In this mode the new part ID will <u>NOT</u> be assigned to the inspection image, it is only used to initiate a new inspection cycle** and the system will assign a unique part ID to the inspection image..
- **Direct Trigger – Part ID provided by the PLC** – this mode works in the exact same way as "External – Part ID provided by the PLC", but instead of receiving the trigger signal from an external sensor, it will receive it from the PLC. In order to generate a new inspection cycle the PLC needs to send a new part ID. In this mode the new part ID will be assigned to the inspection image.
  - <u>Comments for Direct Trigger inspection modes</u> (applies to Direct trigger – Part ID generated by the system, **and** Direct trigger – Part ID provided by the PLC)<u>:</u>
    - When selecting Direct Trigger inspection mode, the system will not show a live video stream. Instead, the system will present a timer stating the time passed since the last inspection:



- **Auto - Part ID generated by the external code reader** – this mode requires a connection of a **USB** code reader to the INSPEKTO S70 controller. When this mode is selected, a new inspection cycle will start only after the connected code reader will stream the read string to the system.
  once a new string has been streamed from the code reader a new inspection will start and the streamed string will be assigned as the inspection image part ID.
  - The system can work with any USB code reader that has an option to act as UID, please refer to your code reader manual to verify this option is available.

- <u>Inspection modes comments:</u>
  - in order to inspect moving objects the system will need to be set to one of the following inspection modes:
    - External – Part ID generated by the system.
    - External – Part ID provided by the PLC.
    - Direct Trigger – Part ID generated by the system.
    - Direct Trigger – Part ID provided by the PLC.

  - The system needs to have an active profile loaded. If an OUT INSPECTION MODE command is sent when there is no active profile loaded, the system will return an Error (see below for details).
  - The “System Ready” signal has to be with value “1” stating “System Ready” (value “0” states “System Not Ready”). If an OUT INSPECTION MODE command is sent when “System Ready” = “0” the system will return an Error (see below for details).

Example: changing inspection mode to Manual.

In order to change inspection mode to manual:

1. Set an OUT_INSPECTION_MODE command in bits 14-10:

Input Number	**14**	**13**	**12**	**11**	**10**
Input Value	0	0	0	0	1

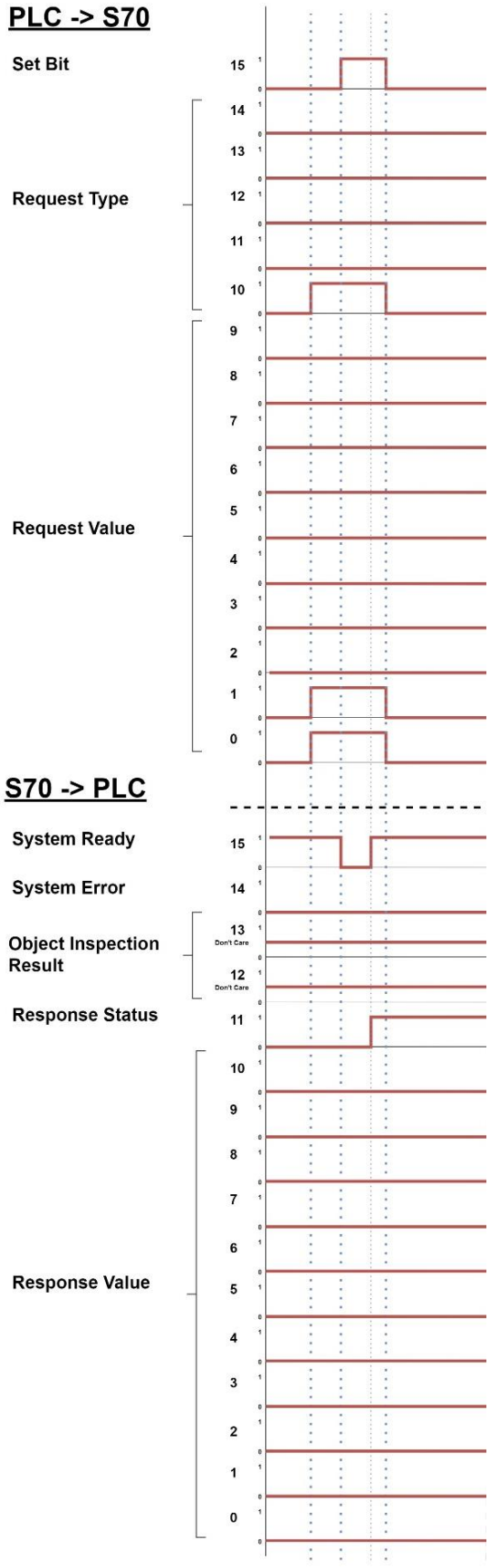
2. Set the value of “3” in binary (11 in binary = 3 in decimal) in bits 9-0:

Input Number	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Input Value	0	0	0	0	0	0	0	0	1	1

3. Set the “Set Bit” (bit 15) to “1”.

After successfully performing the command the INSPEKTO S70 will show:

- System Ready = “1”
- Response Status = “1”
- System Error = “0”
- Inspection Result = remain unchanged
- Response value = remain unchanged


PLC -> S70
Set Bit
Request Type
Request Value
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
S70 -> PLC
System Ready
System Error
Object Inspection Result
Response Status
Response Value
15
14
13
Don't Care
12
Don't Care
11
10
9
8
7
6
5
4
3
2
1
0

Example: Change inspection mode to “Direct trigger – Part ID provided by the PLC”

In order to change inspection mode to “Direct trigger – Part ID provided by the PLC”:

4. Set an OUT_INSPECTION_MODE command in bits 14-10:

Input Number	**14**	**13**	**12**	**11**	**10**
Input Value	0	0	0	0	1

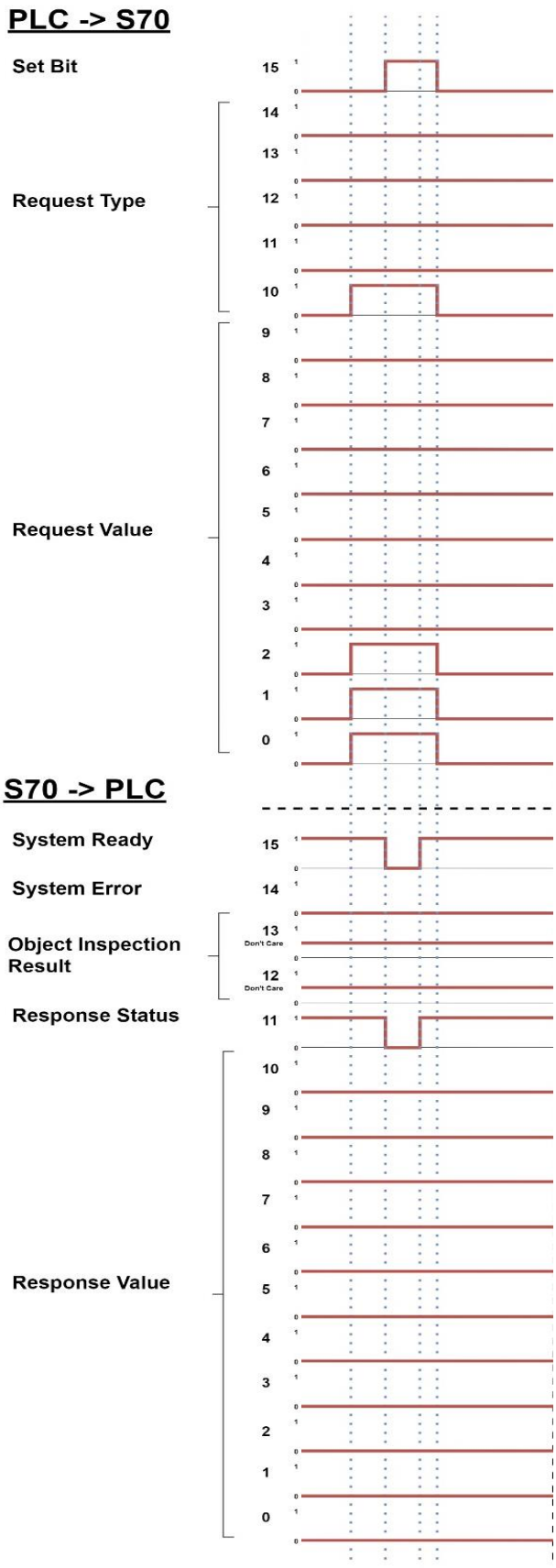
5. Set the value of “7” in binary (111 in binary = 7 in decimal) in bits 9-0:

Input Number	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Input Value	0	0	0	0	0	0	0	1	1	1

6. Set the “Set Bit” (bit 15) to “1”.

After successfully performing the command the INSPEKTO S70 will show:

- System Ready = “1”
- Response Status = “1”
- System Error = “0”
- Inspection Result = remain unchanged
- Response value = remain unchanged


PLC -> S70
Set Bit
Request Type
Request Value
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
S70 -> PLC
System Ready
System Error
Object Inspection Result
Response Status
Response Value
Don't Care
Don't Care

2. OUT NEW OBJECT TRIGGER

When selecting a corresponding inspection mode (any of the inspection modes that ends with “Part ID provided by the PLC), sending this command will start a new inspection cycle.

In the INSPEKTO S70, in order to issue a trigger, the PLC needs to send a new object ID (sometimes referred to as “Part ID”) to the INSPEKTO S70.

- In Digital I/O the part ID has to be a number. The numbers are coded in binary form in the “Request Value” section (bits 0-9), and since there are 10 bits the minimum Part ID value is “1” and the maximum is 1024 (2 ^ 10).
- In order for the INSPEKTO S70 to successfully receive the command any new Part ID sent from the PLC must be of different value from the previous value sent.
- In order for the INSPEKTO S70 to successfully receive the command:
    - The system needs to have an active profile loaded. If an OUT NEW OBJECT TRIGGER command is sent when there is no active profile loaded, the system will return an Error (see below for errors details).
    - The “System Ready” signal has to be with value “1” stating “System Ready” (value “0” states “System Not Ready”). If an OUT NEW OBJECT TRIGGER command is sent when “System Ready” = “0” the system will return an Error (see below for details).

Example: sending a trigger command with Part ID = 810 when the system is set to inspection mode Auto – part ID provided by the PLC and inspection result = Pass.

In order to send a trigger command with a part ID of “810”:

1. the PLC needs to send an OUT_NEW_OBJECT_TRIGGER command in bits 14-10:

Input Number	**14**	**13**	**12**	**11**	**10**
Input Value	0	0	0	1	0

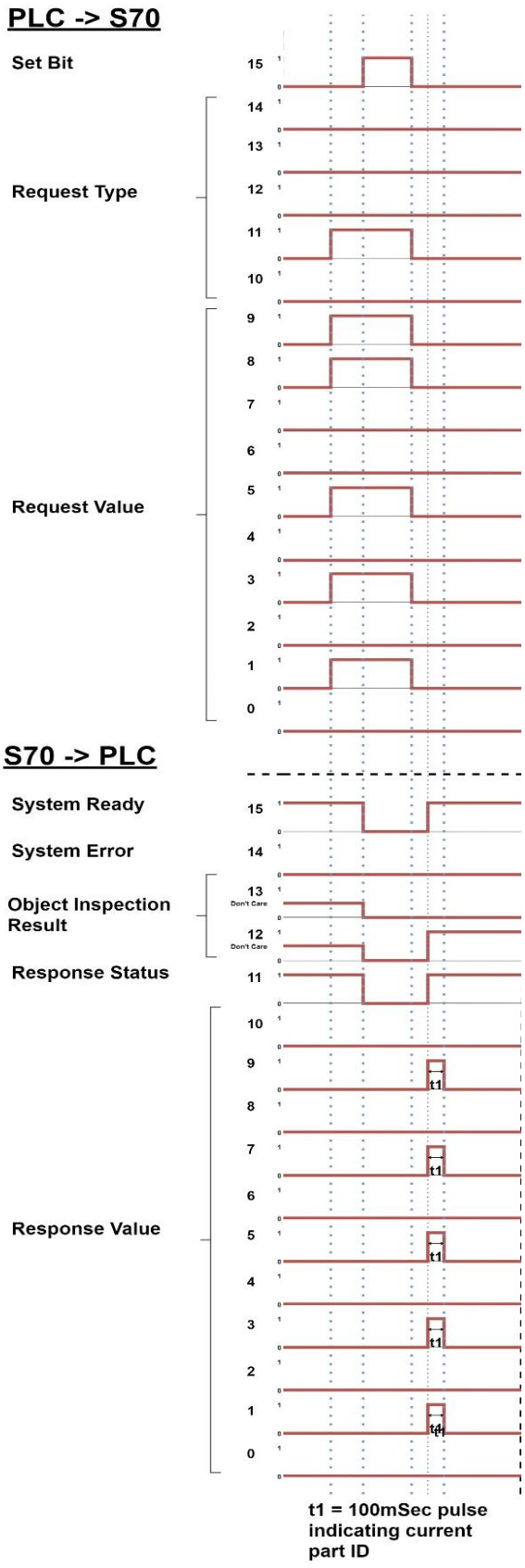
2. The number “810” in binary (1100101010 in binary = 810 in decimal) in bits 9-0:

Input Number	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Input Value	1	1	0	0	1	0	1	0	1	0

3. Set the “Set Bit” (bit 15) to “1”.

After successfully performing the command the INSPEKTO S70 will show:

- System Ready = “1”
- Response Status = “1”
- System Error = “0”
- Inspection Result = “10”. (bit 12 =”1”)
- Response value = “1100101010” (810 in binary) for 100mSec.
    - In case the inspection result is FAIL:
        - Inspection Result = “01” (bit 13 =”1”)
        - Response value – after showing part ID for 100mSec bits 0-9 will show report per ROI (see below for detailed explanation).


PLC -> S70
Set Bit
Request Type
Request Value
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
S70 -> PLC
System Ready
System Error
Object Inspection Result
Response Status
Response Value
Don't Care
t1
t1 = 100mSec pulse indicating current part ID

Example: Sending a trigger command with Part ID = 5 and result is FAIL, with defects in ROI 1 and 4

In order to send a trigger command with a part ID of “5”:

1. the PLC needs to send an OUT_NEW_OBJECT_TRIGGER command in bits 14-10:

Input Number	**14**	**13**	**12**	**11**	**10**
Input Value	0	0	0	1	0

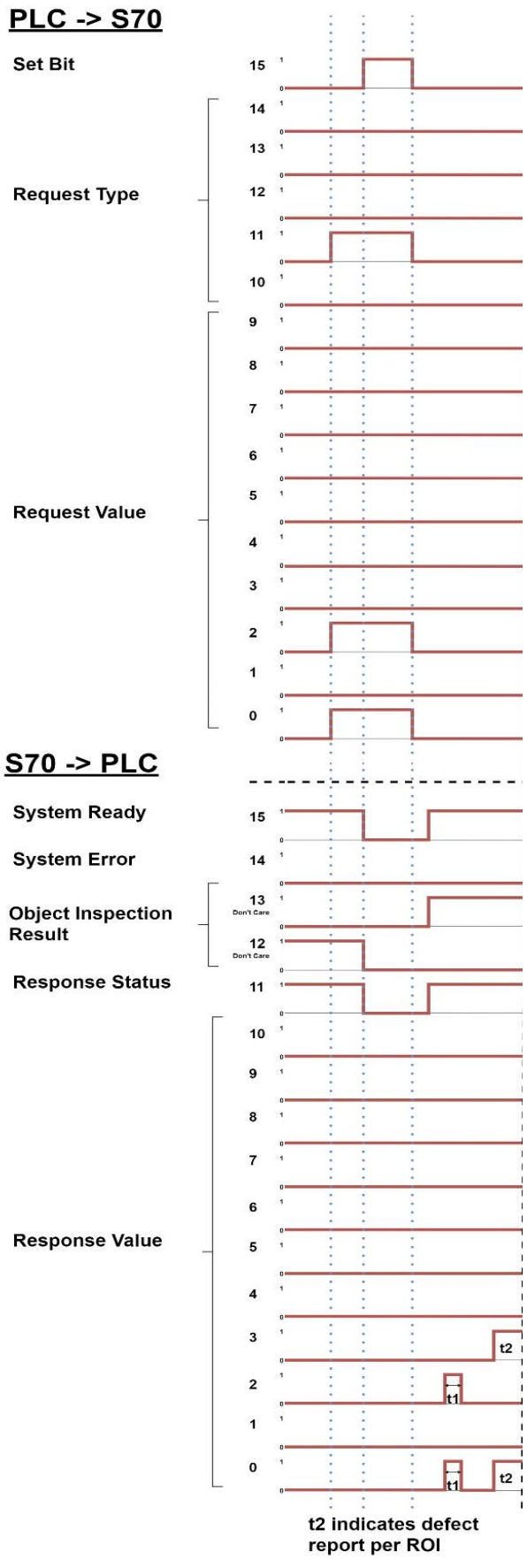
2. The number “5” in binary (0000000101 in binary = 810 in decimal) in bits 9-0:

Input Number	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Input Value	0	0	0	0	0	0	0	1	0	1

3. Set the “Set Bit” (bit 15) to “1”.

After successfully performing the command the INSPEKTO S70 will show:

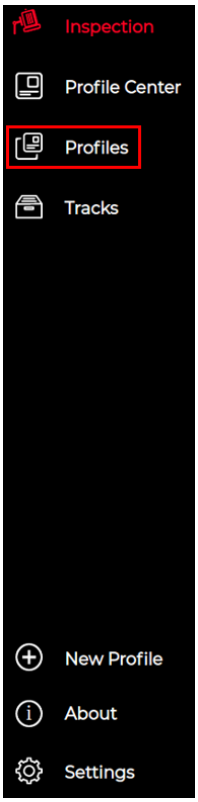
- System Ready = “1”
- Response Status = “1”
- System Error = “0”
- Inspection Result = “01”. (bit 13 =”1”)
- Response value
    - t1 (100mSec) = “0000000101” (5 in binary) for 100mSec.
    - t2 = “0000001001” to indicate defects in ROI 1 (output 0) and ROI4 (output 3)


PLC -> S70
Set Bit
Request Type
Request Value
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
S70 -> PLC
System Ready
System Error
Object Inspection Result
Response Status
Response Value
Don't Care
Don't Care
t1
t2
t1
t2
t2 indicates defect report per ROI

3. Out Profile ID

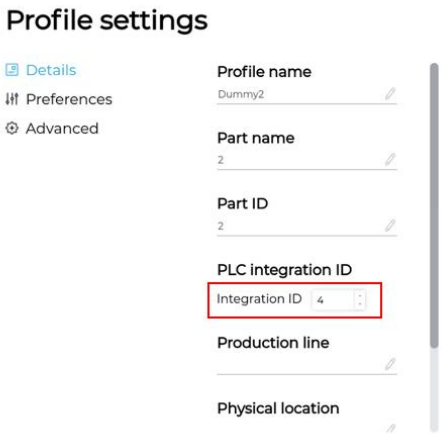
When sending this command, the system will load a profile with the corresponding PLC integration ID.

- There are 2 ways to access a profile PLC integration ID:
  - When a profile is loaded: open profile preferences by pressing on the  icon in the top left corner of the screen.
  - When a profile is not loaded:
    - On the left side panel press on profiles



    - Press on the settings button -  for the relevant profile.

  - The PLC integration ID will appear under “Details” tab:



    - Users can modify the PLC integration ID of a profile to any number ranging from 1-99,999.
    - PLC integration ID's must be unique per profile.
- In order for the system to be able to receive the OUT Profile ID command and load a new profile:
    - The "System Ready" signal has to be with value "1" stating "System Ready" (value "0" states "System Not Ready"). If a new part ID is sent when "System Ready" = "0" the system will return an Error (see below for details).
    - The system must have a profile with the received PLC integration ID value. If received a value that does not apply to any profile in the system, the system will send an Error (see below for details).

Example: loading profile with connectivity ID “7”

In order to send a load profile command with connectivity ID “7”:

1. The PLC needs to send an OUT_PROFILE_ID command in bits 14-10:

Input Number	**14**	**13**	**12**	**11**	**10**
Input Value	0	0	0	1	1

2. The number “7” in binary (000111 in binary = 7 in decimal) in bits 9-0:

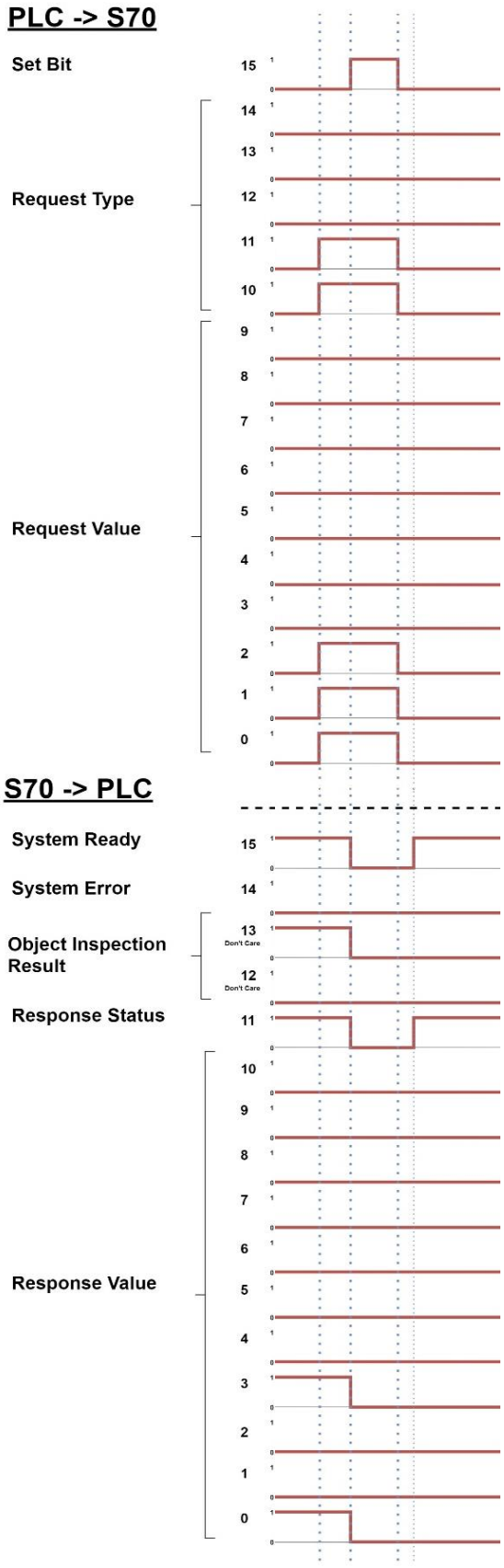
Input Number	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Input Value	0	0	0	0	0	0	0	1	1	1

3. Set the “Set Bit” (bit 15) to “1”.

Following this command, a profile with connectivity ID 7 will load and the system will be ready for inspection.

After successfully performing the command the INSPEKTO S70 will show:

- System Ready = “1”
- Response Status = “1”
- System Error = “0”
- Inspection Result = “00”.
- Response value = “0000000111” (7 in binary)


PLC -> S70
Set Bit
Request Type
Request Value
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
S70 -> PLC
System Ready
System Error
Object Inspection Result
Response Status
Response Value
Don't Care
Don't Care

Example: Load profile with integration ID that does not exist in the system (ID=19)

In order to send a load profile command with connectivity ID “19”:

4. The PLC needs to send an OUT_PROFILE_ID command in bits 14-10:

Input Number	**14**	**13**	**12**	**11**	**10**
Input Value	0	0	0	1	1

5. The number “19” in binary (10011 in binary = 19 in decimal) in bits 9-0:

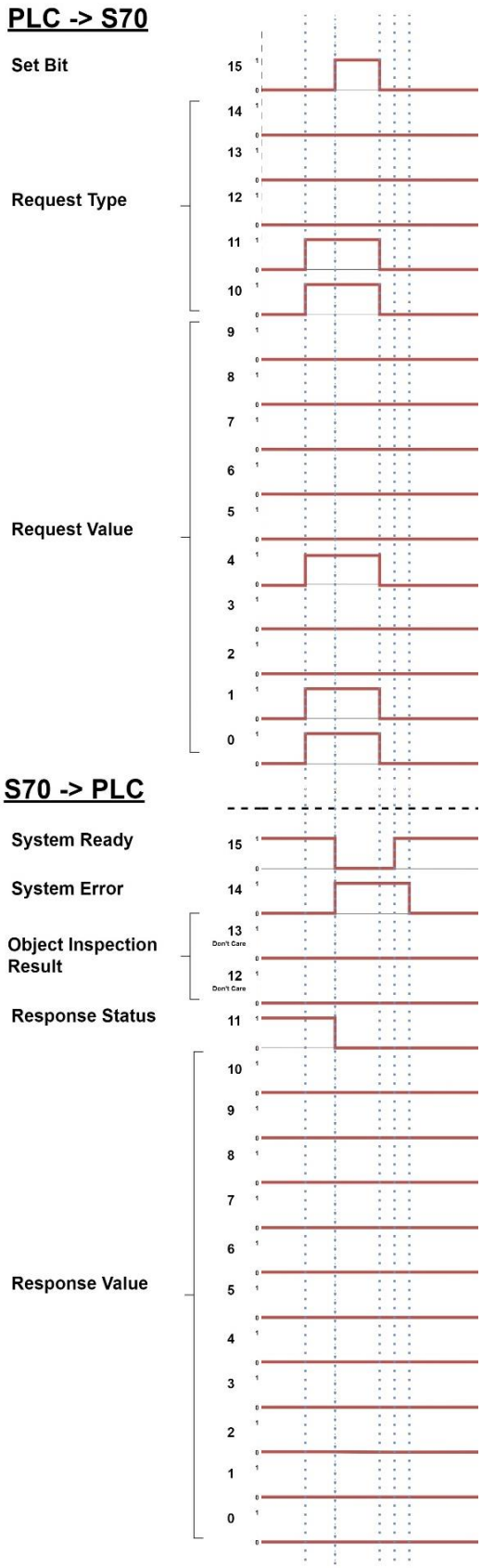
Input Number	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Input Value	0	0	0	0	0	1	0	0	1	1

6. Set the “Set Bit” (bit 15) to “1”.

Following this command, the system will try to load a profile with connectivity ID 19.

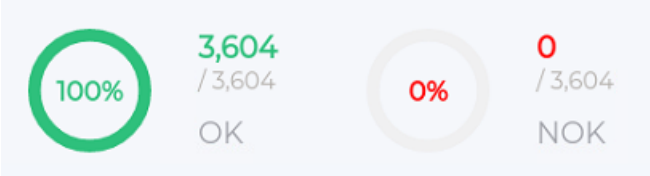
Since the system does not have a profile with connectivity ID 19 the INSPEKTO S70 will show:

- System Ready = “1”
- Response Status = “0”
- System Error = “1”
- Inspection Result = “00”.
- Response value = “0000000000”


PLC -> S70
Set Bit
Request Type
Request Value
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
S70 -> PLC
System Ready
System Error
Object Inspection Result
Response Status
Response Value
Don't Care
Don't Care

4. Out Batch ID

When sending this command the system will reset all counters and assign a new batch ID.



- Batch ID cannot be seen in the INSPEKTO S70 screen.
  - In order for the system to be able to receive the OUT BATCH ID command and start a new batch:
    - The system needs to have an active profile loaded. If a new BATCH ID is sent when there is no active profile loaded, the system will return an Error (see below for errors details).
    - The “System Ready” signal has to be with value “1” stating “System Ready” (value “0” states “System Not Ready”). If a new part ID is sent when “System Ready” = “0” the system will return an Error (see below for details).
    - When sending an OUT Batch ID command without a batch ID, the system will return an Error to the PLC.

Example: start a new batch with batch ID “38”

In order to send a start a new batch command with batch ID “38”

1. The PLC needs to send an OUT_BATCH_ID command in bits 14-10:

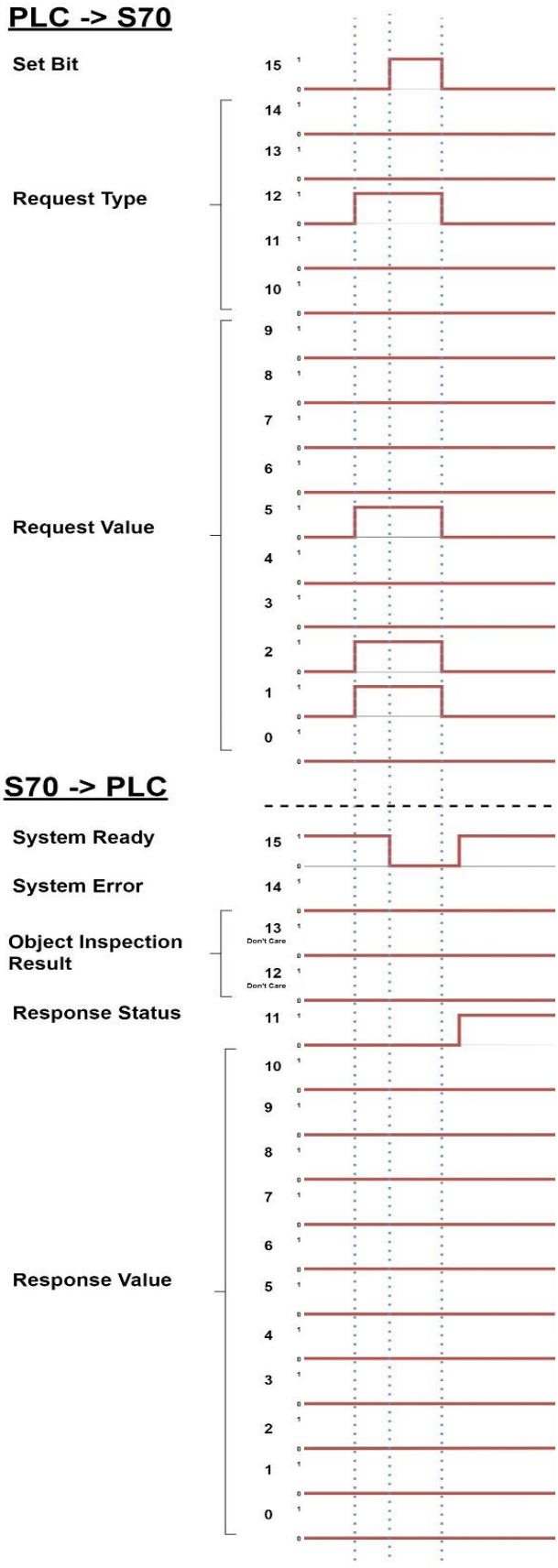
Input Number	**14**	**13**	**12**	**11**	**10**
Input Value	0	0	1	0	0

2. The number “38” in binary (100110 in binary = 38 in decimal) in bits 9-0:

Input Number	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Input Value	0	0	0	0	1	0	0	1	1	0

3. Set the “Set Bit” (bit 15) to “1”.

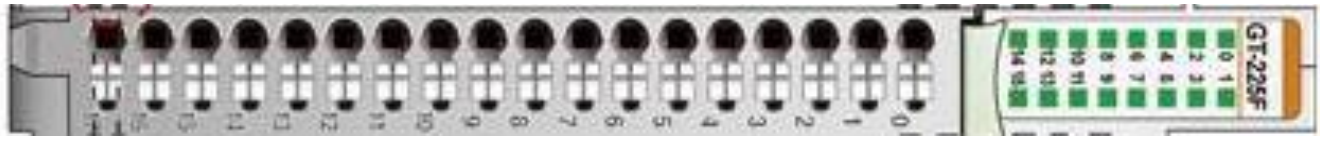
Following this command, the system, will reset all counters and start a new batch with ID of “38”


PLC -> S70
Set Bit
Request Type
Request Value
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
S70 -> PLC
System Ready
System Error
Object Inspection Result
Response Status
Response Value
Don't Care
Don't Care

S70 -> PLC

The S70 to PLC bit distribution is divided to 5:

1. In System Ready – indicates that the system is ready to receive a new command.
2. In System Error – indicates that the system is in error.
3. In Object Inspection Result – specifies the last inspection result.
4. In Response Status – indicates that the last request was handled successfully.
5. In Response Value – specifies the details of the request's response (when applicable)



15(MSB)	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
System Ready	System Error	Object Inspection Result		Response Status	Response Value										

IN SYSTEM READY (Input bit 15)

This signal indicates that the system is ready to receive a new command from the PLC.

- IN_SYSTEM_READY = 1 : System ready
- IN_SYSTEM_READY = 0 : System **not** ready.

The system ready bit will stay at value of "1" until a request is received in the S70.
After a request has been received the system ready bit will change to "0" until the request is being completed. When completed the system ready bit will return to the value of "1" and the system will be ready to receive a new request from the PLC.

In System Error (Input bit 14)

The system error bit will change to "1" in any case of an invalid command, failure to complete a command or general system error.
When the system error bit is at value of "1" the system can not process new requests coming from the PLC.

- The error signal is a response to a request sent from the PLC. In most cases it will not relate to the next request sent, and therefore there is no reset command. In cases of repeating errors – please check the system for issues in the system directly.
- There are various error types and causes as detailed below, but it is important to note that in Digital I/O the INSPEKTO S70 does not detail the type of error that is issued, but only that there is an error.
    - In different connectivity types the error code is detailed as shown below.

Error types (values relevant for other connectivity types):

- **0 = IDLE** – No Error.
- **1 = Camera disconnected** – this error means that the system does not identify the vision system is connected to the controller.
- **2 = Connectivity sync problem** – this error means that the system identifies a communication problem with the PLC.
- **3 = Trigger mode OFF** – this error means that a trigger command was sent from the PLC while the system is in inspection mode = OFF (see above for detailed explanation).
- **4 = No profile loaded** - this error means that a command that requires an active profile in order to perform was sent while there was no active profile running (see above for the various commands requirements).
- **5 = Trigger stopped but not started** – internal error, if encountered repeatedly please contact Inspekto support.
- **6 = System not ready** – this error means that a command was sent from the PLC while "SYSTEM_READY" was with value of "0".
- **7 = Multiple commands received** – this error means that the PLC sent multiple commands at once. In this situation the system will respond with an error because it will have no ability to know which command to perform first.
- **8 = Profile incompatible with requested operation** – this error means that the requested operation could not be performed with the current active profile.

In Object Inspection Results (Input bits 12-13)

These bits will update after an inspection cycle has been completed with the following possible values:

	13	12	Decimal value	Explenation
Idle	0	0	0	the system will show this value before an inspection has taken place in a profile (either after profile load or after system restart)
PASS	0	1	1	Last inspection result is PASS
FAIL	1	0	2	Last inspection result is FAIL
ALERT (object detected, not inspected)	1	1	3	Last inspection result is that the system was able to detect the part, but not to inspect it, due to its position in the image (see profile setup manual for detailed explanation)

- It is recommended that the PLC will treat an ALERT result as a FAIL result.
- These values will stay constant until there is a new inspection result, whether it was triggered by the PLC or by the system user interface.

In Response status (Input bit 11)

The response status bit will indicate whether the last request sent from the PLC was performed successfully or not.
The response status bit will be with value "1" if the request was performed successfully and "0" if there was an error.

In Response Value

The response value bits will include detailed values according to the request sent from the PLC. For example, when performing a new inspection, the system will set the In Object Result bits to indicate the inspection result, **and** will indicate result per ROI in the response value bits

The following modes are detailed in the response value bits:

Request type	Request Value description
Out Inspection Mode	Current inspection mode
Out New Object Trigger	Detailed ROI results

- Result per ROI (Region of interest) explanation:
  - PASS (OK) ROI will have the value of "0".
  - FAIL (NOK) ROI will have the value of "1".
  - When the general inspection result is PASS (OK) all ROI's has PASS results as well.
  - When the general inspection result is FAIL (NOK) ROI's that contains a defect will report as fail.
  - The following table shows the detailed ROI result bits distribution

Bit	10	9	8	7	6	5	4	3	2	1	0
ROI	11	10	9	8	7	6	5	4	3	2	1

Example: Result per ROI

- A profile with 7 ROI's has defects in ROI 1 and 4
  Inspection results bits will indicate inspection failed in bits 13 -12:

Bit	13	12
Value	1	0

  Response value bits will indicate which ROI's has the defects by showing value of "1" in bit 0 (ROI 1) and bit 3 (ROI 4):

Bit	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Value	0	0	0	0	0	0	0	1	0	0	1

- Applicable for V5.0.0 or higher only.

S70 Integration - Discrete Digital I/O

- In Discrete DI/O each I/O line has a specific purpose.
  It is commonly used for integration with edge devices such as Robot/Cobot, pistons, etc.
- In this mode only 8 inputs and 8 outputs are active.
  - Output bits 8-15 are used for reporting per ROI, and users can choose whether to use them or not.

PLC to S70

The following table shows the S70 inputs distribution:

Input	Command
0	Trigger
1	Load profile with Connectivity ID 1
2	Load profile with Connectivity ID 2
3	Load profile with Connectivity ID 3
4	Load profile with Connectivity ID 4
5	Load profile with Connectivity ID 5
6	Load profile with Connectivity ID 6
7	Load profile with Connectivity ID 7

S70 to PLC

The following table shows the S70 outputs distribution:

Output	Command
0	System ready
1	System error
2	N.C
3	Part detected
4	Part not detected
5	Inspection result pass
6	Inspection result fail
7	Profile loaded successfully
8	ROI1 Result
9	ROI2 Result
10	ROI3 Result
11	ROI4 Result
12	ROI5 Result
13	ROI6 Result
14	ROI7 Result
15	ROI8 Result

- Requests to the S70 should be sent only when SYSTEM READY bit = “1”. Sending a request when SYSTEM READY = “0” will result in an error.
- After each request SYSTEM READY bit will change to 0 and will return to 1 when the operation is completed.
- Loading profile in discrete I/O mode is only available for profiles with integration ID 1-7. In case there is a need to change profile integration ID.
    - Please refer to the OUT_PROFILE_ID section above (under Standard Digital I/O section) to see how to change a profile PLC Integration ID
- Bit 7 (profile loaded successfully) will stay at value of 1 while profile is running.
- Detailed ROI inspection results sent by the S70 (bits 8-15) are detailed as such:
    - Value of “0” – indicates the ROI result is PASS (OK)
    - Value of “1” – indicates the ROI result is FAIL (NOK).

Examples:

1. Inspection result pass:

Output	Command	Value
0	System ready	1
1	System error	0
2	N.C	0
3	Part detected	1
4	Part not detected	0
5	Inspection result pass	1
6	Inspection result fail	0
7	Profile loaded successfully	1
8	ROI1 Result	0
9	ROI2 Result	0
10	ROI3 Result	0
11	ROI4 Result	0
12	ROI5 Result	0
13	ROI6 Result	0
14	ROI7 Result	0
15	ROI8 Result	0

2. Inspection result fail with defect in ROI 3:

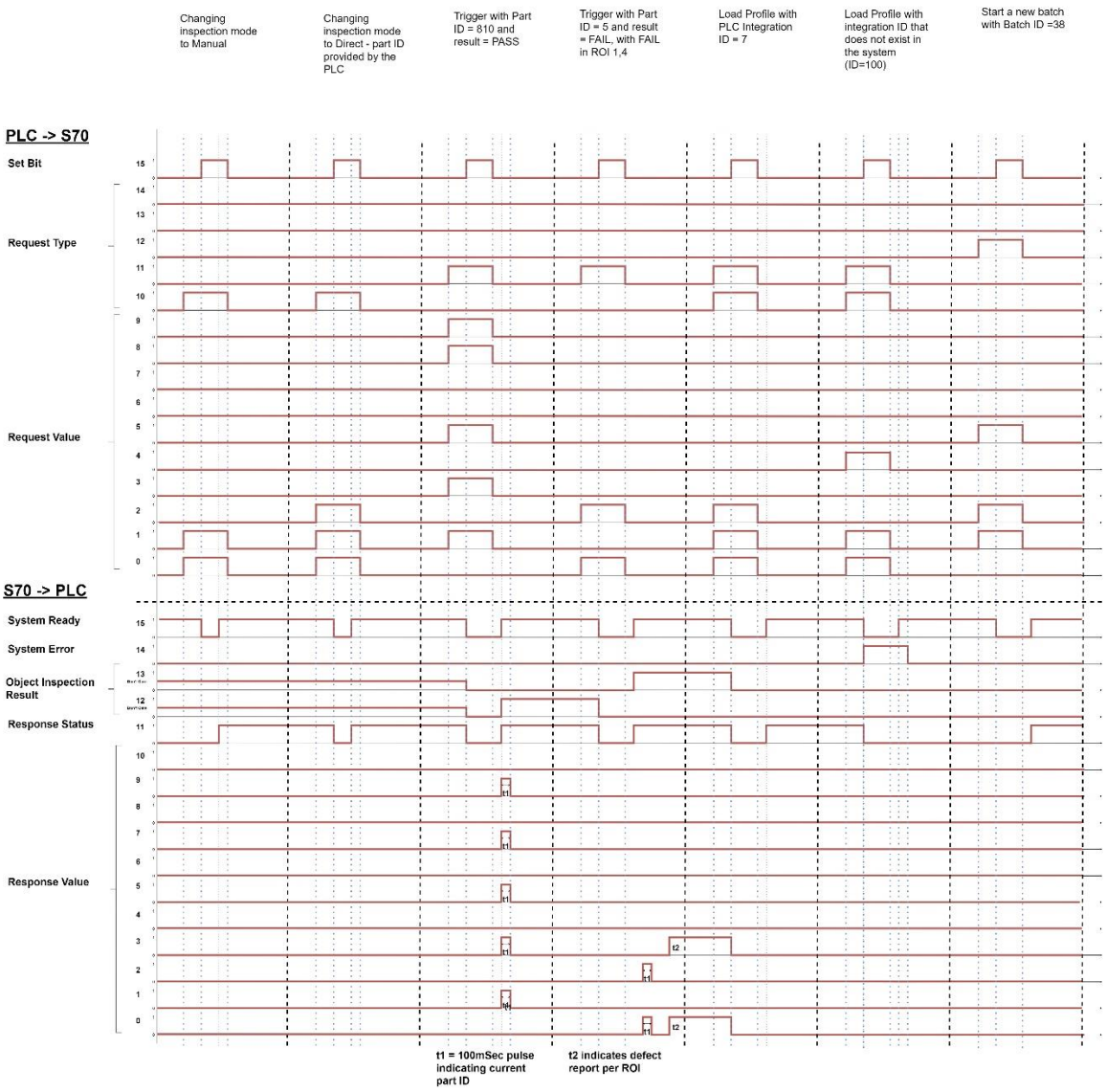
Output	Command	Value
0	System ready	1
1	System error	0
2	N.C	0
3	Part detected	1
4	Part not detected	0
5	Inspection result pass	0
6	Inspection result fail	1
7	Profile loaded successfully	1
8	ROI1 Result	0
9	ROI2 Result	0
10	ROI3 Result	1
11	ROI4 Result	0
12	ROI5 Result	0
13	ROI6 Result	0
14	ROI7 Result	0
15	ROI8 Result	0

3. Inspection result part not detected:

Output	Command	Value
0	System ready	1
1	System error	0
2	N.C	0
3	Part detected	0
4	Part not detected	1
5	Inspection result pass	0
6	Inspection result fail	1
7	Profile loaded successfully	1
8	ROI1 Result	0
9	ROI2 Result	0
10	ROI3 Result	0
11	ROI4 Result	0
12	ROI5 Result	0
13	ROI6 Result	0
14	ROI7 Result	0
15	ROI8 Result	0

7. Signal Flow Charts

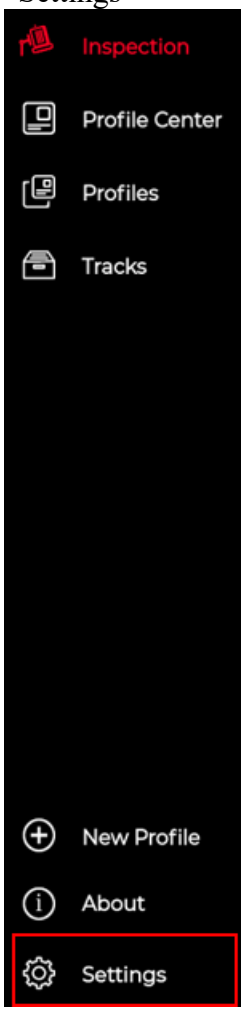
- The below time charts are a summary of the signal flow charts that appear in this manual.
    - Zoom in for details.



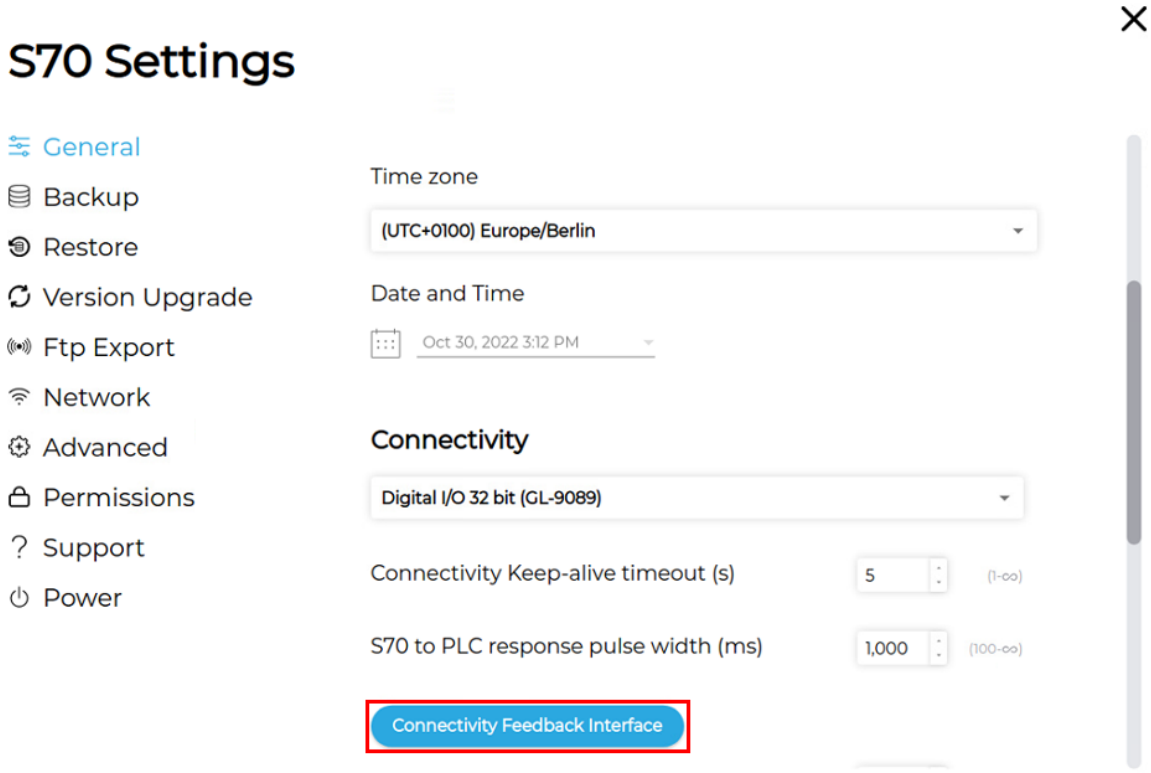
8. Using the INSPEKTO S70 Connectivity Feedback Interface

the INSPEKTO S70 system includes a feature called connectivity feedback. This feature is aimed to test and ensure correct communication with all type of connectivity available in the INSPEKTO S70.
When integrating the INSPEKTO S70 with Digital I/O or Discrete Digital I/O, it is recommended to first test all of the messages using this interface to verify that (A) signals are going back and forth between the INSPEKTO S70 and the PLC and (B) that they are received in the right place and form. For example, when sending an OUT_PROFILE_ID command from the PLC with value of "2" we would want to make sure that the relevant I/Os shows values that corresponds with it.

In the S70 screen hover over the left side of the screen so the menu will open, and press on "Settings"

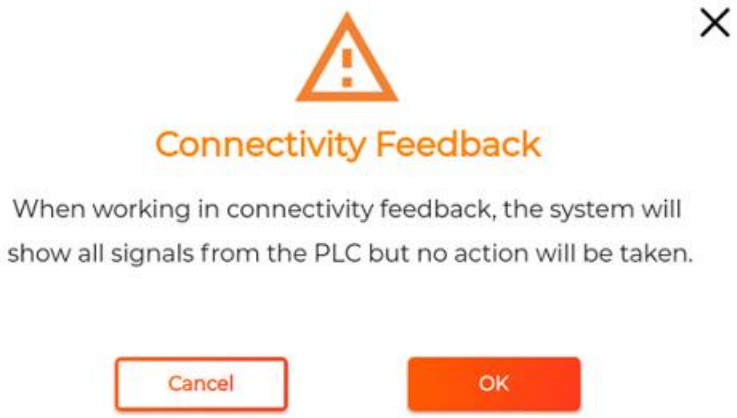


Under general tab scroll down to the connectivity section and press on the "Connectivity Feedback Interface" button:



Once selected, the system will show a pop-up message stating that the system will now only show signals coming from the PLC but will not act on them. This means that when working in "Connectivity Feedback Interface" all signals coming from the PLC will be received and shown in the interface but no action will take place.

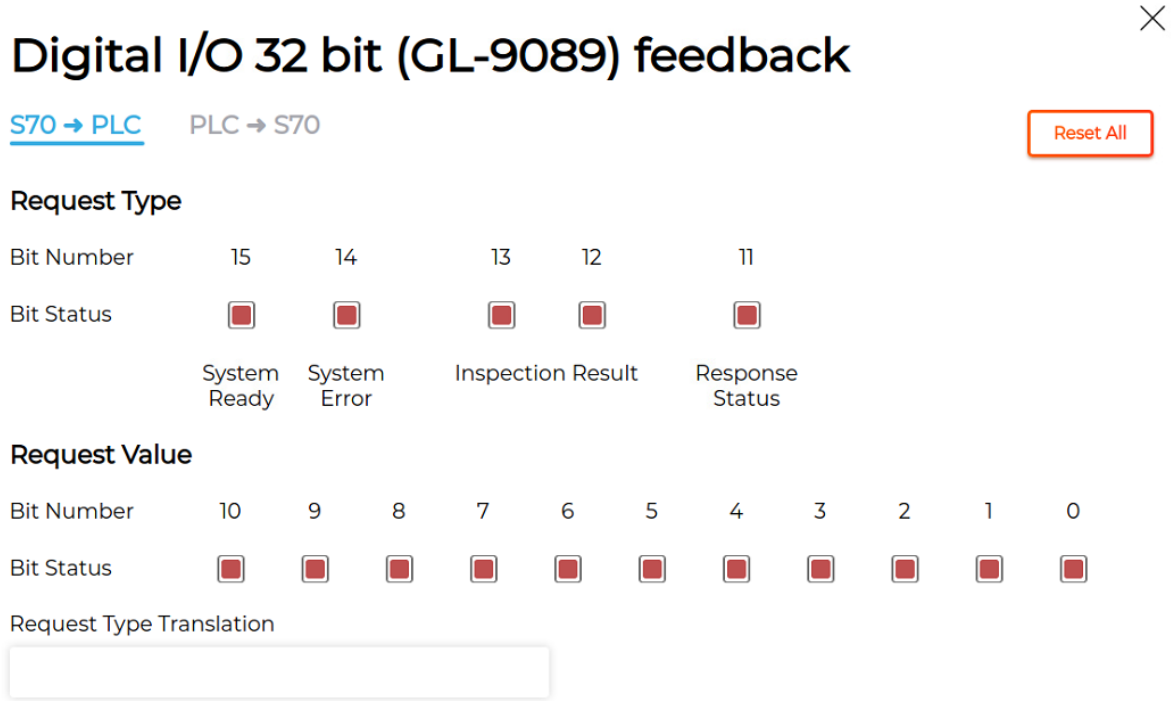
- When closing the Connectivity Feedback Interface all PLC communication will return to normal state automatically.



The Connectivity Feedback screen has 2 tabs, one for messages going from the INSPEKTO S70 to the PLC, and the other from messages going from the PLC to the INSPEKTO S70.

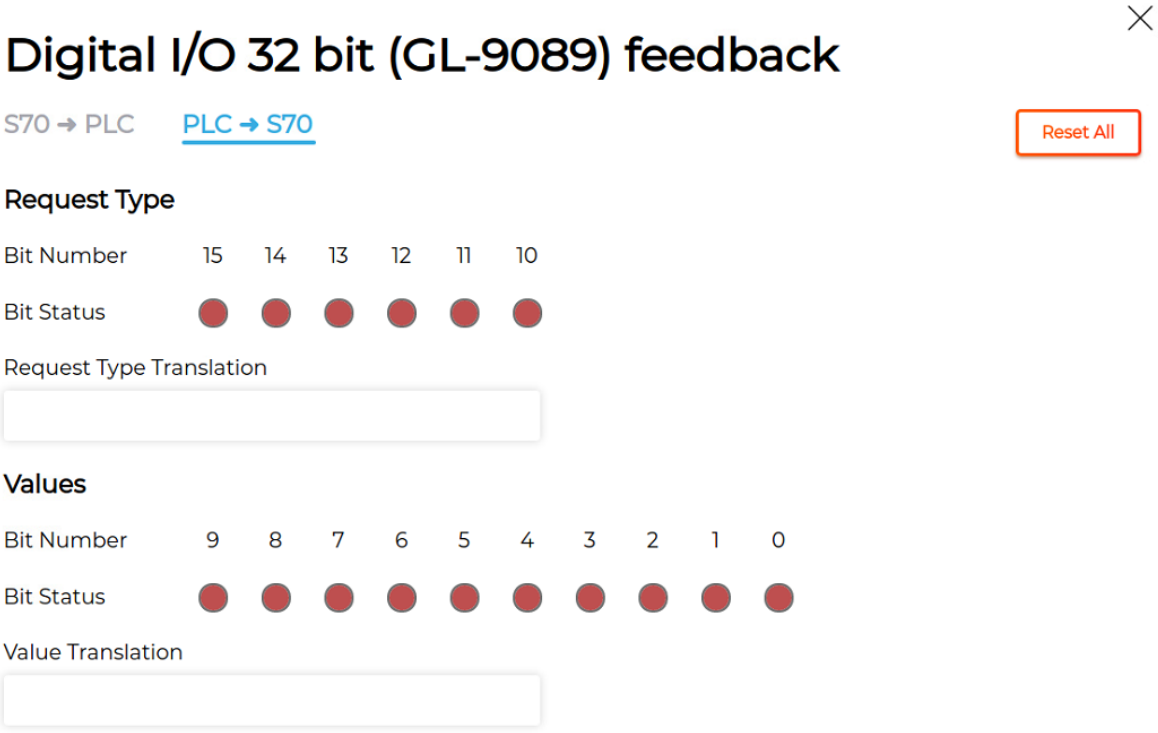
- The content of the Connectivity Feedback screen will change according to the selected connectivity method. This manual relates to the Digital I/O Connectivity Feedback screen only. For other connectivity methods please see the relevant integration manual.

S70 -> PLC screen:



This screen contains all of the possible signals (I/O) going from the INSPEKTO S70 to the PLC.
In order to send a signal to the PLC mark the checkbox of the wanted signal.
Pressing the “Reset All” button will reset all signals.
If the connection is established successfully, you will be able to see the corresponding I/Os in the PLC and on the LEDs on the INSPEKTO S70 I/O module.

PLC -> S70 screen:



This screen contains all of the possible signals (I/O) coming from the PLC to the INSPEKTO S70.
When the connection is established successfully, the fields will be updated automatically every time a message is being sent from the PLC to the INSPEKTO S70.

9. Information and instructions

6.1 Disposal of Equipment

WEEE (Waste Electrical and Electronic Equipment). This product should be disposed of, at the end of its useful life, as per applicable local laws, regulations, and procedures.

6.2 CE Statement

Following testing in an external lab, the S70 system was found in compliance with the EMC & the Safety requirements defined in the European generic Standards EN 61326-1: 2013, EN 61000-3-2:2014, EN 61000-3-3:2013, EN 61010-1:2010 & EN 50581:2012 Which identifies the Emission, Immunity & Safety standards requirements for an ITE equipment. Crevis Digital I/O modules are certified as well, details can be found on the manufacturers site, links are provided below.

6.3 RMA

Keep the original package for shipping in case of hardware failure. In case of hardware failure of the Inspekto S70 Digital I/O module under warranty, please contact Inspekto support at: support@inspekto.com and provide the following required information:

- Serial number/s
- Name of purchaser

[1] More information about the **GT-12DF** unit can be found at the following link - http://www.crevis.co.kr/eng/product/view01.php?str_bcode=030620002&str_no=603&page=1

[2] More information about the **GT-226F** unit can be found atthe following link: http://www.crevis.co.kr/eng/product/view01.php?str_bcode=030620003&str_no=605&page=1

More information about the **GT-225F** unit can be found at the following link: http://www.crevis.co.kr/eng/product/view01.php?str_bcode=030620003&str_no=604&page=1

[3] More information about the **GL-9089** unit can be found atthe following link: https://crevis.us/product/gl-9089/

Should you have any further questions do not hesitate to contact the Inspekto support team.