FT-10

Smart Process Indicator

User Manual

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1 SAFETY INSTRUCTIONS

CAUTION: READ this manual BEFORE operating or servicing this equipment. FOLLOW these instructions carefully. SAVE this manual for future reference. DO NOT allow untrained personnel to operate, clean, inspect, maintain, service, or tamper with this equipment. ALWAYS DISCONNECT this equipment from the power source before cleaning or performing maintenance.

CALL Flintec for parts, information, and service.

WARNING: Only permit qualified personnel to service this equipment. Exercise care when making checks, tests and adjustments that must be made with power on. Failing to observe these precautions can result in bodily harm.

WARNING: For continued protection against shock hazard connect to properly grounded outlet only. Do not remove the ground prong.

WARNING: Disconnect all power to this unit before removing the fuse or servicing.

WARNING: Before connecting/disconnecting any internal electronic components or interconnecting wiring between electronic equipment always remove power and wait at least thirty (30) seconds before any connections or disconnections are made. Failure to observe these precautions could result in damage to or destruction of the equipment or bodily harm.

CAUTION: Observe precautions for handling electrostatic sensitive devices.

2 INTRODUCTION

2.1 Overview

FT-10 family instruments are economic and powerful state-of-the-art technology indicators for weighing and force measurements. These instruments convert the low-level strain gage load cell analogue signal to digital signal in high resolution and accuracy to transmit digital data to PLC or PC. With a wide variety of interface, FT-10 instruments are used for any type of weighing processes and force measurement including tank and silo weighing, dynamic weighing, check weighing, filling, tension /compression force measurement etc.

2.2 Key features

	FT-10P	FT-10IO	FT-10AN	FT-10MB	FT-10PB	FT-10PN	FT-10EN	FT-10CO	FT-10EI	FT-10EC	FT-10CC	FT-10PL
1 000 to 999 999 display resolution	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
High internal resolution up to 16 000 000 counts	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Up to 1600 conversion per second	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Serial interface RS 232C	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Serial interface RS 485	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Analogue output	-	-	YES	-	-	-	-	-	-	-	-	-
Profibus DPV1 interface	-	-	-	-	YES	-	-	-	-	-	-	-
Profinet interface	-	-	-	-	-	YES	-	-	-	-	-	-
Ethernet interface (Modbus TCP/IP)	-	-	-	-	-	-	YES	-	-	-	-	-
CANopen interface	-	-	-	-	-	-	-	YES	-	-	-	-
Ethernet IP interface	-	-	-	-	-	-	-	-	YES	-	-	-
EtherCAT interface	-	-	-	-	-	-	-	-	-	YES	-	-
CC-Link interface	-	-	-	-	-	-	-	-	-	-	YES	-
Powerlink	-	-	-	-	-	-	-	-	-	-	-	YES
Continuous data output	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Fast Continuous data output	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
BSI data interface	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Modbus RTU	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Modbus TCP	-	-	-	-	-	-	YES	-	-	-	-	-
2 programmable digital input/output (non-isolated)	YES	-	-	-	-	-	-	-	-	-	-	-
4 digital input and 5 relay contact output	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Error and at zero outputs (non-isolated)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bidirectional signal input for force measurement	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Unit selection (g, kg, t, lb, klb, N, kN)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Peak function	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Hold function	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Auto-zero tracking and auto-zero at power-up	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Motion detection	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Zeroing and Taring via interface	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Adaptive digital filter for faster measuring	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Electronic calibration (eCal) without test weights	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Electronic calibration (eCal) over field bus	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Zero and Span calibrations over field bus	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Zero adjustment	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Span adjustment with test weights	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Span adjustment for filled tanks	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
3 point calibration (linearity correction)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
8 load cells 350 Ω or 18 load cells 1100 Ω	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
12 to 28 VDC power supply range	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

2.3 Specifications:

Common Specifications	
Accuracy	
Accuracy class	III
EU Type approval	10 000 intervals
A/D Converter	
A/D converter type	24 bit Delta-Sigma radiometric with integral analog and digital filters
Conversion rate	Up to 1600 measurement values per second
Input sensitivity	0.4 μV/d (approved) 0.1 μV/d (industrial)
Analog input range	0 mV to +18 mV (unipolar) ; - 18 mV to +18 mV (bipolar)
Internal resolution	up to 16 000 000
External Resolution	
Display resolution	up to 10 000 increment (approved); up to 999 999 increment (industrial)
Scale Calibration and Functions	
Calibration	Calibration is performed with or without test weights (eCal)
Digital filter	10 steps programmable adaptive filter
Weighing functions	Taring, zeroing, auto zero tracking, motion detection, auto zero at power up, net indication at power on, increased resolution
Linearity	
	Within 0.0015% FS, ≤ 2 ppm/°C
Load cells	
Excitation	5 VDC max. 300 mA
Number of load cells	Up to 8 load cells 350 Ω or 18 load cells 1100 Ω in parallel
Connection	4- or 6-wire technique. Cable length: maximum 1000 m/mm² for 6-wire connection
Communication	
RS-232	1200 to 115200 baudrate, 8N1 / 7O1 / 7E1 / 8O1 / 8E1
Response speed	Up to 4ms response delay after read / write commands

Digital Inputs and Outputs	
Digital Inputs	2 ports can be programmed as dig. input or output, non-isolated for FT-10P 4 optoisolated digital inputs at FT-10IO, FT-10MB, FT-10AN, FT-10PB, FT-10PN, FT-10EN, FT-10CO, FT-10EI, FT-10EC, FT-10CC; 12 to 28 VDC, 10mA
Digital Outputs	2 ports can be programmed as dig. input or output, non-isolated for FT-10P 5 free relay contact at FT-10IO, FT-10MB, FT-10AN, FT-10PB, FT-10PN, FT-10EN, FT-10CO, FT-10EI, FT-10EC, FT-10CC; 250 VAC or 30 VDC, 1A
Error & at Zero outputs	U_0= Power supply voltage – 1.5V, 100mA. Non-isolated transistor outputs.
Power consumption	
	12 to 28 VDC max. 300 mA
Environment and Enclosure	
Operation temperature	-10…+40°C; 85% RH max, non-condensing; -15…+55°C (industrial)
Enclosure	Panel type, front and rear panel are stainless steel; Aluminum body
Protection	Front panel IP65

FT-10 AN Analogue (optional)	
Communication	
Voltage output	0-5 VDC, 0-10 VDC
Current output	4-20mA, 0-20mA
D/A Converter	16 bit
Max. cable length	300 meter
Max. load resistance (current output)	500 Ω

FT-10 MB Modbus-RTU	
Communication	
RS-485	1200 to 115200 baudrate, 8N1 / 7O1 / 7E1 / 8O1 / 8E1
Response speed	Up to 4 ms response delay after read/write commands
Max Stations	Up to 31 stations per segment

FT-10 PB Profibus DPV1 (optional)	
Communication	
Data rate	Up to 12000 kbit/s with automatic baud rate detection
GSD file	Generic GSD-file provided
Topology	Depending on physical media RS-485: segmented line topology without stubs
Installations	Shielded twisted pair cable Line length depending on physical media and transmission speed
Max. Stations	Up to 32 stations per segment, up to 126 stations per network
Isolation	Galvanically isolated bus electronics
Response speed	Up to 4 ms response delay after read/write commands

FT-10 PN Profinet (optional)	
Communication	
Data rate	100 Mbit/s, full duplex
GSDML file	Generic GSDML-file provided
TCP/IP settings	DHCP or manual IP assign over Indface1x PC Software. Device identity customization
Topology	Line, Bus, Star or Tree topology depending on physical media
Installation	Switched Ethernet transmission with shielded twisted pair cables and RJ-45 connectors.
Web client	Available
Isolation	Galvanically isolated bus electronics
Response speed	Up to 4 ms response delay after read/write commands

FT-10 EN Ethernet (optional)	
Communication	
Transmission rate	10 Mbit/s, half duplex
TCP/IP settings	Manual IP assign over Indface1x PC Software or by keys in programming mode.
Installation	Switched Ethernet transmission with shielded twisted pair cables and RJ-45 connectors.
Web client	Available
Response speed	Up to 4 ms response delay after read/write commands

FT-10 CO CANopen (optional)	
Communication	
Data rate	10 kbit/s – 1 Mbit/s (selectable) kbit/s
ESD file	Generic EDS-file provided
Topology	Line with Trunkline, Dropline structure and Termination at both Ends Line length depending on baudrate 25 – 500 meters.
Installation	2 wire shielded twisted pair cable Alternatively, 4 wire with 24 Volt power over the bus
Max. Stations	Up to 127 stations per network
Isolation	Galvanically isolated bus electronics
Response speed	Up to 4 ms response delay after read/write commands

FT-10 EI EtherNet/IP (optional)	
Communication	
Data rate	10 kbit/s – 100 Mbit/s, full duplex
ESD file	Generic EDS-file provided
DLR (Device Level Ring)	Available
TCP/IP settings	DHCP or manual IP assign over Indface1x PC Software. Device identity customization
Topology	Line, Bus, Star or Tree topology depending on physical media
Installation	Switched Ethernet transmission with shielded twisted pair cables and RJ-45 connectors.
Web client	Available
Isolation	Galvanically isolated bus electronics
Response speed	Up to 4 ms response delay after read/write commands

FT-10 EC EtherCAT (optional)	
Communication	
Data rate	100 Mbit/s, full duplex
ESD file	Generic EDS-file provided
Topology	Line, Tree, Star or Daisy-chain topology depending on physical media
Installation	Switched Ethernet transmission with shielded twisted pair cables and RJ-45 connectors.
Isolation	Galvanically isolated bus electronics
Response speed	Up to 4 ms. response delay after read/write commands.
Topology	Line, Tree, Star or Daisy-chain topology depending on physical media

FT-10 CC CC-Link (optional)	
Communication	
Data rate	156 kbit/s – 10 Mbit/s (selectable)
Topology	Line with Trunkline, Branch structure and Termination at both Ends.
Installation	3 wires shielded twisted pair cable.
Max. Stations	Up to 64 stations per network
Isolation	Galvanically isolated bus electronics
Response speed	Up to 4 ms. response delay after read/write commands

FT-10 PL Powerlink (optional)	
Data rate	100 Mbit/s, half duplex
Compatibility	Supports POWERLINK V2.0 Communication Profile Specification version 1.2.0
XDD file	XDD-file provided
Ring redundancy	Available
Topology	100% free choice of star, tree, ring or daisy chain
Installation	Switched Ethernet transmission with shielded twisted pair cables and RJ-45 connectors.
Isolation	Galvanically isolated bus electronics
Response speed	Up to 4 ms. response delay after read/write commands

2.4 The Front View and Key Functions

Figure 2.1 - Front panel view of FT-10

2.4.1 Display

The weight display of FT-10 consists of 7-segments LED. At the right side of the display there are two LEDs for indicating the net and the units (standard kg), and on the left side of the display for indicating the gross, centre of zero and unstable status.

The meanings of the announcement LED on the display are:

Gross	Announces the indicated value is the gross weight.
Net	Announces the indicated value is the net weight.
→0←	Announces the weight is in the centre of zero.
~	Announces the weight value on the display is unstable.
Units	g, kg, t, lb, klb, N, kN units are located on the right of the display.

2.4.2 Key Pad

The keys and the key functions of FT-10 are:

Function: Key function is programmable to Increased Indication, Total, Tare value indication, CN value indication, Peak function and Hold function at parameter [**116**] (Page 37).

GN / Set Point: Pressing this key the Gross weight will be indicated temporarily. To enter the set point menu, **long press** this key.

Tare / Clear: Tares the scale and gets into the Net mode. Pressing the key again clears the tare.

Zeroing: In Gross mode, if the scale doesn't show zero while there is no load on the pan, you can zero the scale by pressing this key.

Print: Weight data and other information depending on the setup parameters are sent to a printer or a PC via serial port.

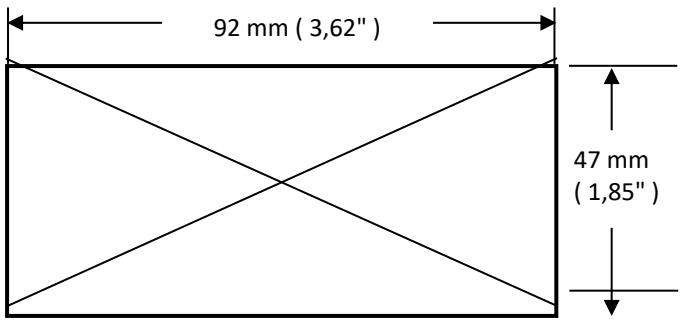
2.4.3 Key Lock

FT-10 has an ability to lock the keys to avoid unauthorized people interfere. The key(s) which would be locked are programmed at parameter [**115**].

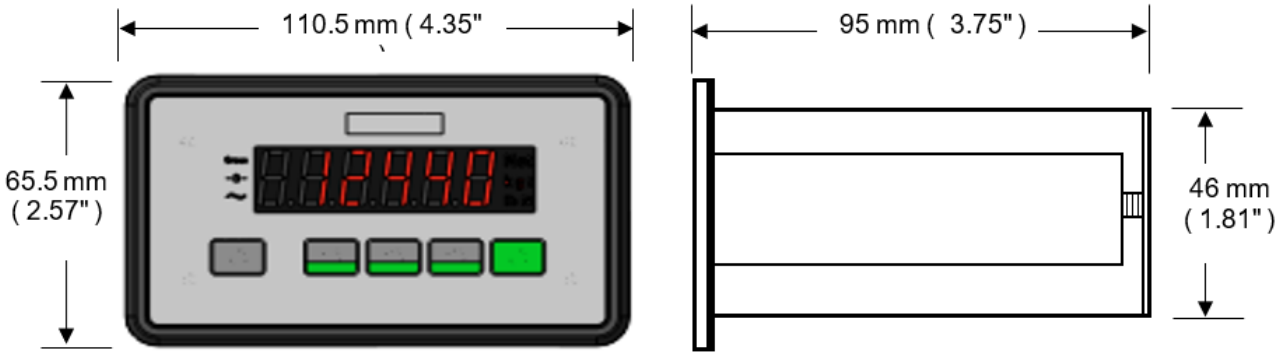
You can activate or deactivate this function by long pressing <F> key, press <→0←> and <↵> keys sequentially. [**Lock**] prompt appears for a short while to indicate the pressed key is locked.

2.4.4 Housing

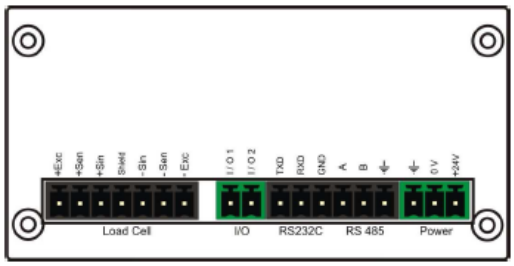
FT-10 housings are panel type with stainless steel front and back parts, and aluminium body.



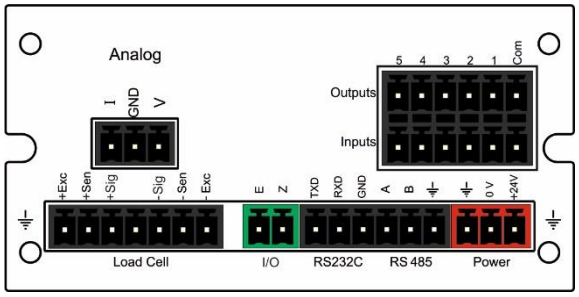
The hole dimensions for mounting FT-10 on the panel



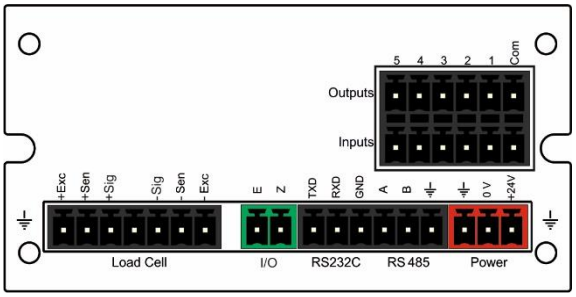
FT-10 front and side view



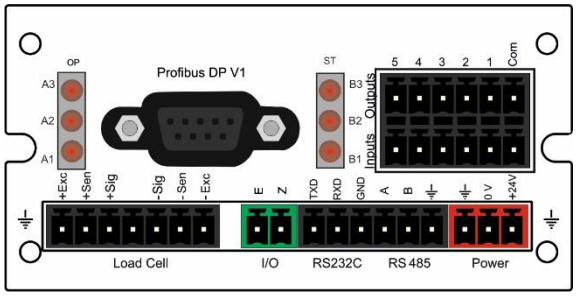
FT-10P rear view



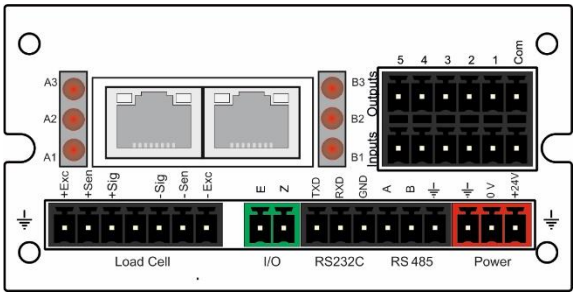
FT-10AN rear view



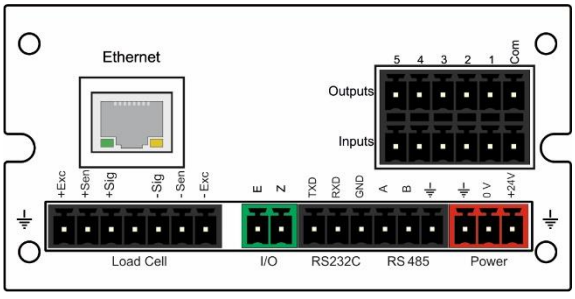
FT-10IO & FT-10MB rear view



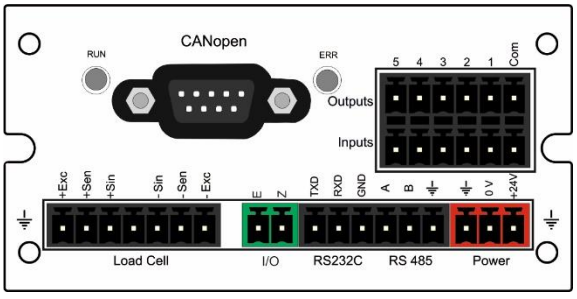
FT-10PB rear view



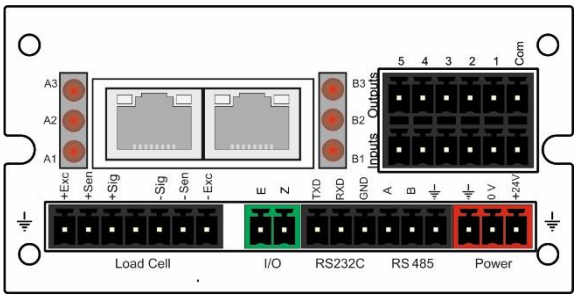
FT-10PN rear view



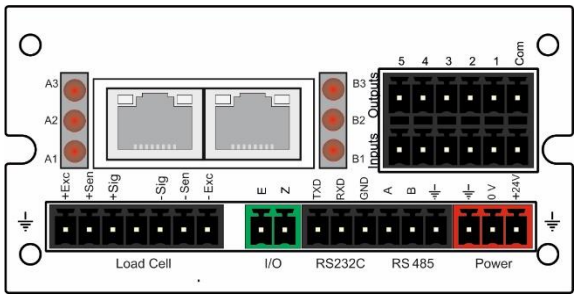
FT-10EN rear view



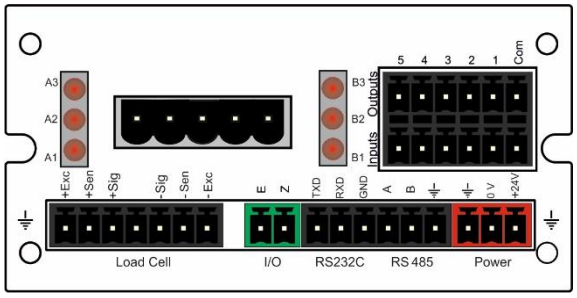
FT-10CO rear view



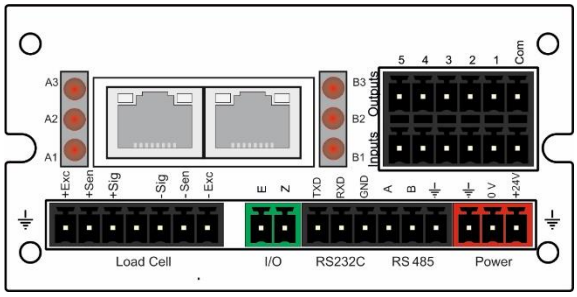
FT-10EI rear view



FT-10EC rear view



FT-10CC type rear view



FT-10PL type rear view

3 INSTALLATION

PRECAUTION: *Please read this section carefully before installation of the instrument. Applying the recommendations in this section will increase your system reliability and long-term performance.*

3.1 Rekommandation

Please follow the installation and commissioning steps described below carefully to prevent unwanted results after installation.

3.1.1 Control Cabinet Design

Warning: *Please care the following warnings for designing the control cabinet which will increase your system reliability.*

The control cabinet should be designed so that Analog Digitizer can operate safely. The panel should be placed in a clean area, not getting direct sun light, if possible, with a temperature between -10 ºC and +40 ºC, humidity not exceeding 85% non-condensing (-15 and +55°C non approved). All external cables should be installed safely to avoid mechanical damages.

FT-10 instruments are very low level signal measuring instruments. To avoid electrical noise, FT-10 should be separated from the equipment that produces electrical noise. Preferable use metal cabinet against radio frequency interference and the cabinet shall be connected to ground against the electromagnetic disturbances. Load cell cable trays must be separated from others, if possible. If there are noise-generating equipment such as heavy load switches, motor control equipment, inductive loads etc., please be careful against the EMC interference in the cabinet. If possible, protect FT-10 instruments with the faraday cage or install them in separate section or install them far away from this kind of equipment. Connect parallel reverse diodes to the DC inductive loads like relays, solenoids etc. to minimize voltage peaks on the DC power lines.

3.1.2 Cabling

All cables coming to the control cabinet shall be shielded. Please use separate cable tray for these low signal level cables. Distance from load cell cables, interface cables and DC power supply cables to power line cables shall be minimum 50 cm.

3.2 Mechanical Installation

Take care to the housing dimensions and the suggested panel hole dimensions. To avoid electrical noises, protect your indicator which has very low input signal level from the equipment that produces electrical noise in panel mounting.

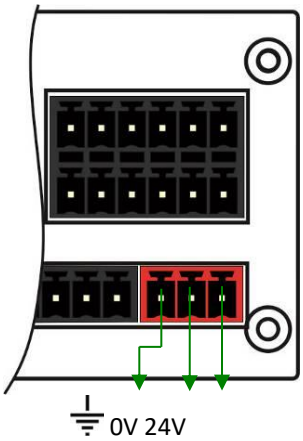
3.3 Electrical Connections

Warning: *Please always remember that FT-10 instruments are very low voltage measuring instruments. Your control cabinet design and proper installation increases the reliability and performance of the instrument. Please do not forget that the instrument must be powered off before inserting or removing any peripheral connector.*

The electrical installation and quality of instrument's grounding will provide weighing accuracy and the safety of your indicator. If the energy condition of your plant is bad, prepare a special power line and grounding. All required electrical connections should be done as described below.
If you have to service the indicator, turn the power off and wait at least 30 seconds before interfering.

3.3.1 Power Supply Connection and Grounding

Power supply voltage of the instrument shall be between 12 VDC and 28 VDC. The pin configuration of the 24 VDC power supply connector located right - bottom of the instrument is shown in Figure 4.1 below.



The pin layout of the 24 VDC connector of FT-10 Series

(rear view)

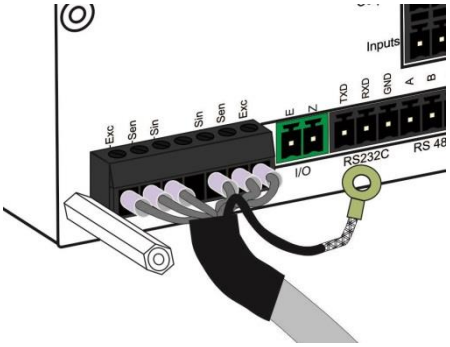
Figure 4.1 - The pin layout of 24VDC connector

The quality of the instrument's ground will determine the accuracy and the safety of your measuring system. A proper ground connection is needed to minimize extraneous electrical noise effects on the measurement. A poor ground can result in an unsafe and unstable operation. It is important that the instrument should not share power lines with noise-generating parts such as heavy load switching relays, motor control equipment, inductive loads, etc. If the condition of the power line in the plant is poor, prepare a special power line and grounding.
Before interfering the instrument, turn off the power and wait at least for 30 seconds.

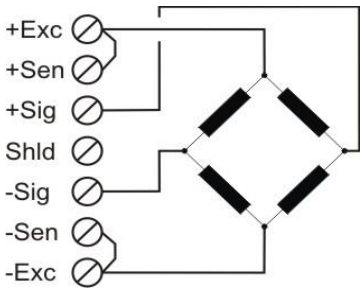
***Warning**: Connect the Shield pin to the reference ground.*

3.3.2 Load Cell Connection

To avoid damages, the load cell wiring should be made carefully before energizing the instrument. Load cell connection detail is shown in Figure 4.2
In 4-wire installations the sense and excitation pins with the same polarity **should be short circuited** at the connector side. If you have junction box, use 6 wire cable between FT-10 and the junction box, and short circuit these pins at junction box for better performance.



4 wire LC connection



6 wire LC connection

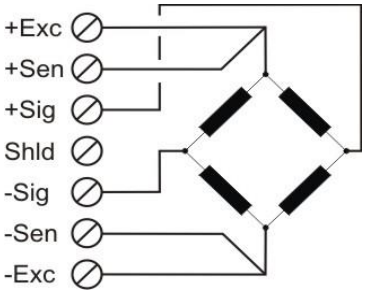
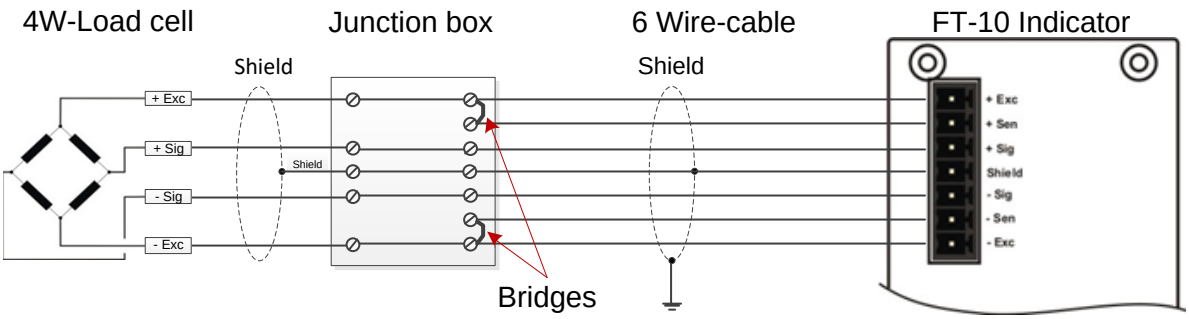


Figure 4.2 - Load cell connections

***Warning**: Always connect Sense pins to Excitation pins for 4 wire connection. Non-connected sense pins may cause the wrong Excitation voltage measurement and create an accuracy problem.*

***Warning**: Connect the load cell cable shield to the reference ground or shield pin of the load cell connector.*



3.3.3 RS 232C Connection

RS 232C port usage and specifications are shown in the table 4.1

Usage	Interfacing with PC or PLC, remote display connection, programming via IndFace1X
Data formats	Continuous, Fast Continuous, Printer Format, BSI Protocol, Modbus-RTU High-Low, Modbus-RTU Low-High
Baud rate	1200 / 2400 / 4800 / 9600 (Default) / 19200 / 38400 / 57600 / 115200 bps
Length and parity	8 bit no parity (Default), 7 bit odd, 7 bit even, 8 bit odd, 8 bit even
Start / Stop bits	1 start bit and 1 stop bit

Table 4.1 – RS 232C Serial Interface Specifications

RS 232C serial connection is done with three wires as indicated below.

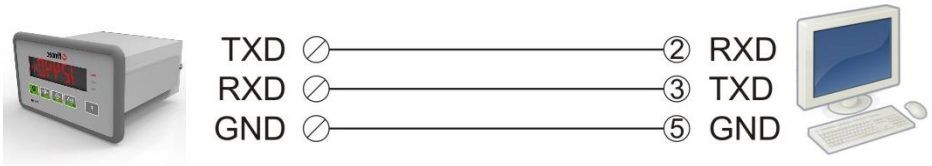


Figure 4.3 - RS 232C serial interface connections

Warning: *Connecting the shield to the reference ground will protect your weighing system against EMC disturbances.*

Warning: *Disconnect IndFace1X PC software before starting Modbus-RTU interfacing.*

3.3.4 RS 485 and Modbus-RTU Connection

RS 485 port usage and specifications are shown in the table below (*Page 33*).

Usage	Interfacing with PC or PLC, remote display, programming via IndFace1X
Data formats	Continuous, Fast Continuous, Printer Format, BSI Protocol, Modbus-RTU High-Low, Modbus-RTU Low-High
Baud rate	1200 / 2400 / 4800 / 9600 (Default) / 19200 / 38400 / 57600 / 115200 bps
Length and parity	8 bit no parity (Default), 7 bit odd, 7 bit even, 8 bit odd, 8 bit even
Start / Stop bits	1 start bit and 1 stop bit

Table 4.2 - RS 485 Serial Interface Specifications

RS 485 serial connection is done with three wires as indicated in Figure 4.4. Line termination resistors (110 ohm) are needed both ends of the RS 485 line.

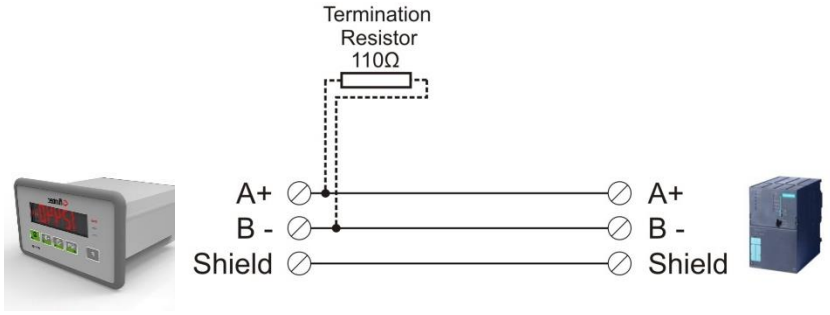


Figure 4.4 – RS 485 serial interface connections

Warning: *Connect the shield to the reference ground.*
Warning: *Disconnect IndFace1X PC software before starting Modbus-RTU interfacing.*

3.3.5 Analogue Connection (only FT-10 AN)

FT-10AN is programmable to 4 – 20 mA, 0 – 20 mA, 0 – 5 V or 0 – 10 V analogue output types.

Analogue connections are done as indicated in Figure 4.5 and Figure 4.6

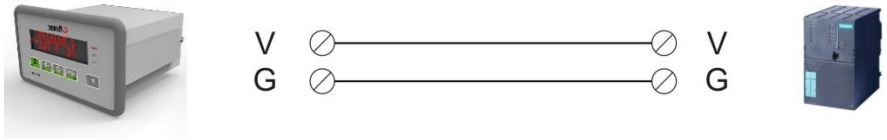


Figure 4.5 - FT-10 AN Voltage output connections

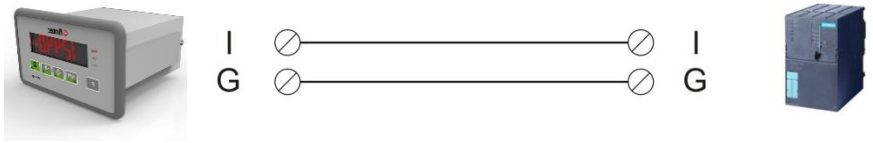


Figure 4.6 - FT-10 AN Current output connections

3.3.6 Profibus Connection (only FT-10 PB)

Profibus connection is done as indicated in Figure 4.7.

Figure 4.7 - FT-10 PB serial interface connections

PROFIBUS Connector pin configuration (DB9F)

Pin	Signal	Description
1	-	-
2	-	-
3	B Line	Positive RxD / TxD, RS-485 level
4	RTS	Request to send
5	GND Bus	Ground (isolated)
6	+5V Bus Output	+5V termination power (isolated)
7	-	-
8	A Line	Negative RxD / TxD, RS-485 level
9	-	-
Housing	Cable Shield	Ground

3.3.7 Profinet Connection (only FT-10 PN)

Profinet connection is done as indicated in Figure 4.8.

Figure 4.8 - FT-10 PN serial interface connections

PROFINET Connector pin configuration (RJ45)

Pin	Signal	DIR	Description
1	TX+	Out	Differential Ethernet transmit data +
2	TX−	Out	Differential Ethernet transmit data −
3	RX+	In	Differential Ethernet receive data +
6	RX−	In	Differential Ethernet receive data −
4	Not used		Terminated
5	Not used		Terminated
7	Not used		Terminated
8	Not used		Terminated
	Shield		Chasis ground

The HUB connection cabling will be a direct connection as shown in Figure 4.9:

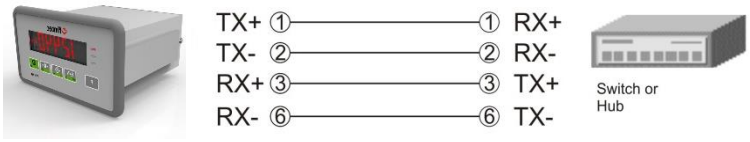


Figure 4.9 - HUB connection

The PC connection cabling will be done via cross cable as shown below. IP address blocks and gateway address of FT-10 and PC should be the same in cross connection.

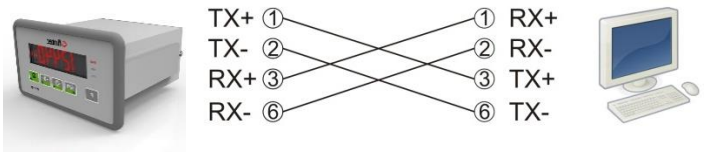


Figure 4.10 - Cross PC connection

Warning: *Connect the shield to the reference ground or shield pin of the power connector.*

Warning: *Disconnect IndFace1X PC software before starting Modbus-RTU interfacing.*

3.3.8 Ethernet Connection (only FT-10 EN)

Ethernet interface is used for data transfer to PC or PLC in the formats shown below.

Usage	Ethernet interface with PC or PLC
Data formats	Continuous, Fast Continuous, Printer Format, BSI Protocol, Modbus TCP/IP High-Low, Modbus TCP/IP Low-High
Ethernet	The Ethernet interface operates at 10Mbit, half duplex

Ethernet Connector pin configuration (RJ45)

Pin	Signal	DIR	Description
1	TX+	Out	Differential Ethernet transmit data +
2	TX–	Out	Differential Ethernet transmit data –
3	RX+	In	Differential Ethernet receive data +
6	RX–	In	Differential Ethernet receive data –
4	Not used		Terminated
5	Not used		Terminated
7	Not used		Terminated
8	Not used		Terminated
	Shield		Chassis ground

The HUB connection cabling will be a direct connection as shown below:

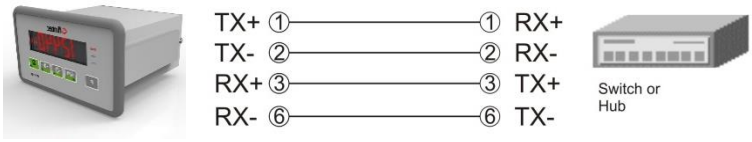


Figure 4.11 - HUB connection

The PC connection cabling will be done via cross cable as shown below. IP address blocks and gateway address of FT-10 and PC should be the same in cross connection.

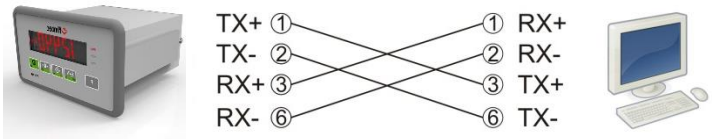


Figure 4.12 - Cross PC connection

Warning: *Connect the shield to the reference ground or shield pin of the power connector.*

Warning: *Disconnect IndFace1X PC software before starting Modbus-RTU interfacing*

3.3.9 CANopen Connection (only FT-10 CO)

CANopen connection is done with 4 wires as indicated in Figure 4.13. The data line ends must be equipped with 120-ohm bus terminating resistors.

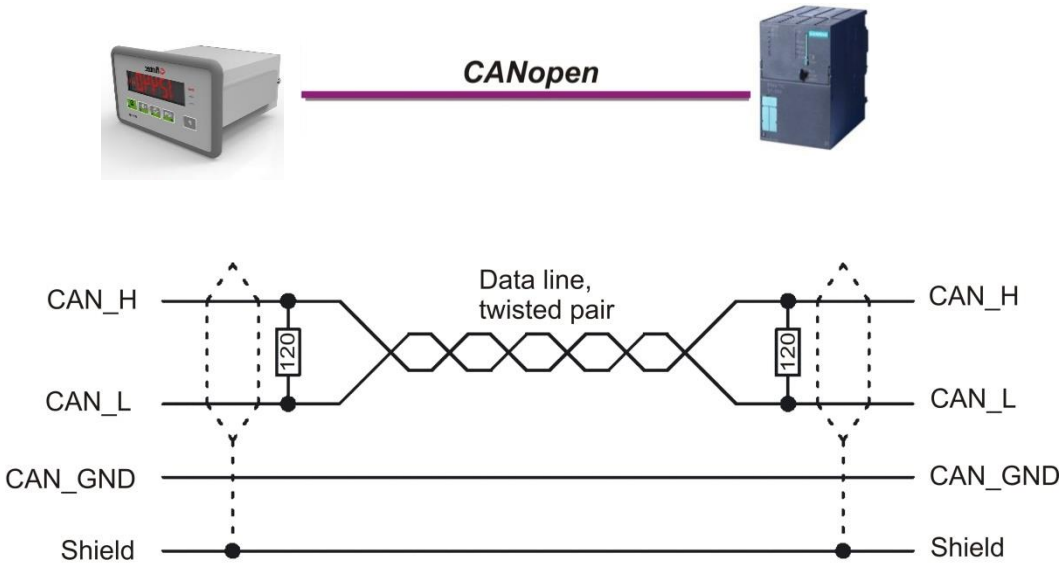


Figure 4.13 - FT-10 CO serial interface connections

CANopen Connector pin configuration (DB9M)

Pin	Signal	Description
1	-	-
2	CAN_L	-
3	CAN_GND	-
4	-	-
5	CAN_SHIELD	-
6	-	-
7	CAN_H	-
8	-	-
9	-	-
Housing	Cable Shield	-

Warning: *Connect the shield to the reference ground.*
Warning: *Disconnect IndFace1X PC software before starting Modbus-RTU interfacing.*

3.3.10 EtherNet/IP Connection (only FT-10 EI)

EtherNet/IP connection is done as indicated below in Figure 3.1.

Figure 3.16 – FT-10EI interface connections

EtherNet/IP Connector pin configuration (RJ45)

Pin	Signal	DIR	Description
1	TX+	Out	Differential Ethernet transmit data +
2	TX–	Out	Differential Ethernet transmit data –
3	RX+	In	Differential Ethernet receive data +
6	RX–	In	Differential Ethernet receive data –
4	Not used		Terminated
5	Not used		Terminated
7	Not used		Terminated
8	Not used		Terminated
	Shield		Chassis ground

The HUB connection cabling will be a direct connection as shown below:

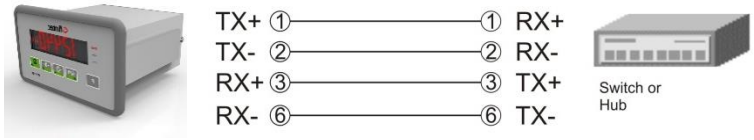


Figure 3.2 - HUB connection

The PC connection cabling will be done via cross cable as shown below. IP address blocks and gateway address of FT-10 and PC should be the same in cross connection.

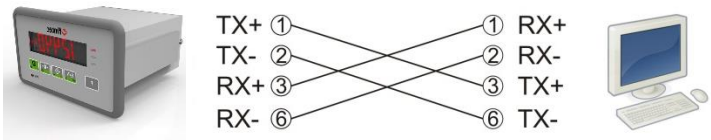


Figure 3.3 - Cross PC connection

***Warning*:** Connect the shield to the reference ground or shield pin of the power connector.
Warning: Disconnect IndFace1X PC software before starting EtherNet/IP interfacing.

3.3.11 EtherCAT Connection (only FT-10 EC)

EtherCAT connection is done as indicated below in **Figure 3.4**.

Figure 3.4 – FT-10EC interface connections

EtherCAT Connector pin configuration (RJ45)

Pin	Signal	DIR	Description
1	TX+	Out	Differential Ethernet transmit data +
2	TX–	Out	Differential Ethernet transmit data –
3	RX+	In	Differential Ethernet receive data +
6	RX–	In	Differential Ethernet receive data –
4	Not used		Terminated
5	Not used		Terminated
7	Not used		Terminated
8	Not used		Terminated
	Shield		Chassis ground

The HUB connection cabling will be a direct connection as shown below:

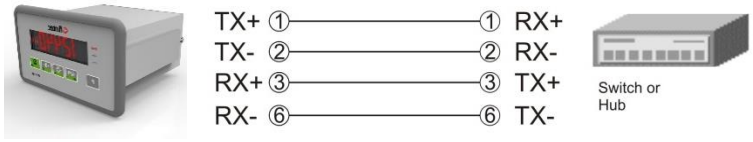


Figure 3.5 - HUB connection

The PC connection cabling will be done via cross cable as shown below. IP address blocks and gateway address of FT-10 and PC should be the same in cross connection.

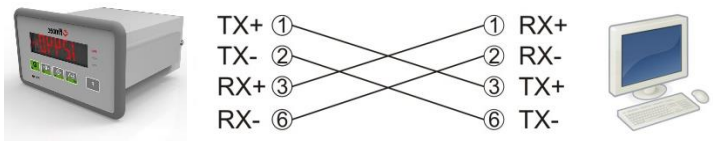


Figure 3.6 - Cross PC connection

Warning: Connect the shield to the reference ground or shield pin of the power connector.
Warning: Disconnect IndFace1X PC software before starting EtherCAT interfacing.

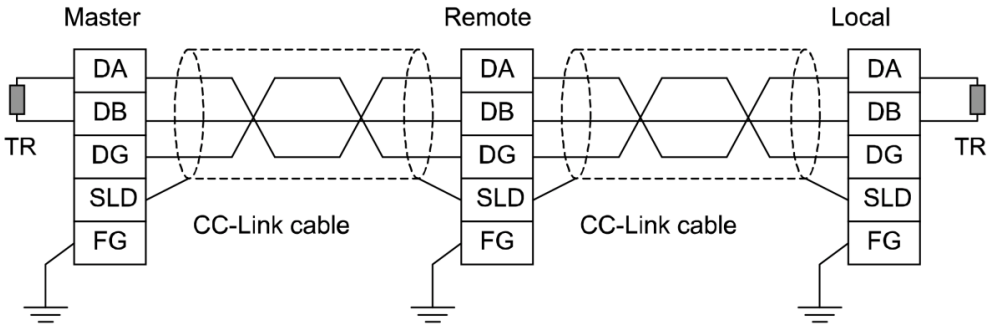
3.3.12 CC-Link Connection (only FT-10 CC)

CC-Link connection is done as indicated below in **Figure 3.7**.

Figure 3.7 – FT-10CC interface connections

CC-Link Connector pin configuration

Pin	Signal	Description
1	DA	PositiveRS485 Rxd/TxD
2	DB	NegativeRS485 Rxd/TxD
3	DG	Signal ground
4	SLD	Cable Shield
5	FG	Protective Earth



Warning: Connect the shield to the reference ground or shield pin of the power connector.
Warning: Disconnect IndFace1X PC software before starting CC-Link interfacing.

3.3.13 Powerlink Connection (only FT-10 PL)

Powerlink connection is done as indicated below in Figure 3.8.

Figure 3.8 – FT-10 PL interface connections

Powerlink Connector pin configuration (RJ45)

Pin	Signal	DIR	Description
1	TX+	Out	Differential Ethernet transmit data +
2	TX–	Out	Differential Ethernet transmit data –
3	RX+	In	Differential Ethernet receive data +
6	RX–	In	Differential Ethernet receive data –
4	Not used		Terminated
5	Not used		Terminated
7	Not used		Terminated
8	Not used		Terminated
	Shield		Chassis ground

The HUB connection cabling will be a direct connection as shown below:

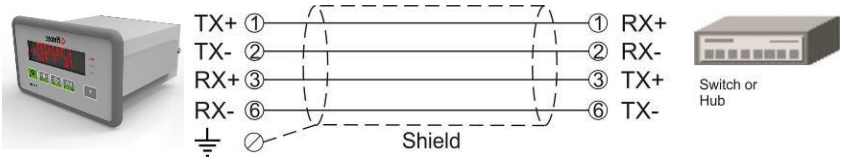
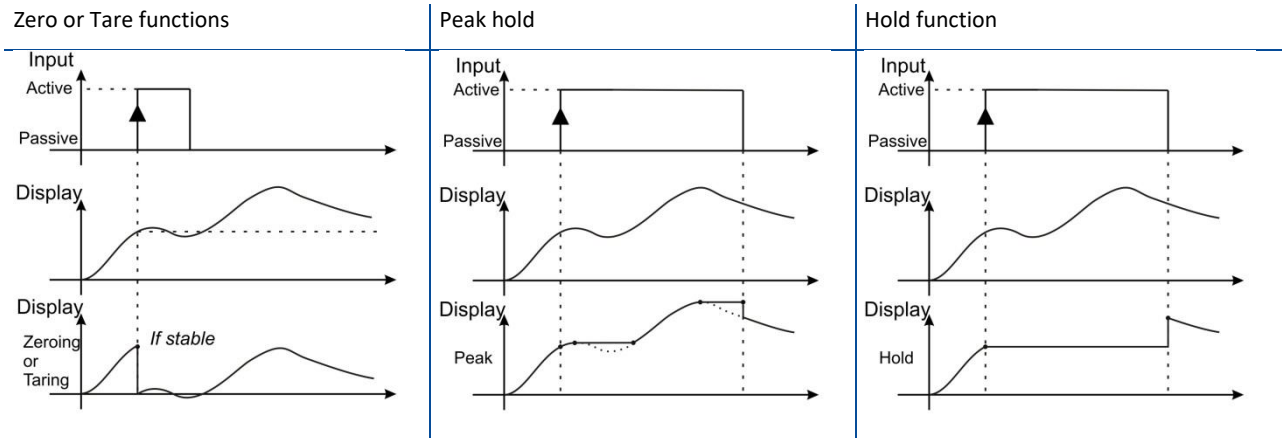


Figure 3.9 - HUB connection

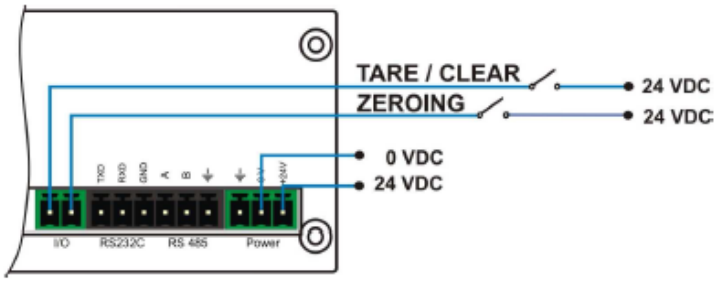
Warning: *Connect the shield to the reference ground or shield pin of the power connector.*
Warning: *Disconnect IndFace1X PC software before starting Powerlink interfacing.*

3.3.14 Digital Inputs

FT-10 inputs are independently programmable for zeroing, taring, clear, print, key lock, peak, hold, and as a fieldbus input port. If the input is programmed as a fieldbus input port, the input status is transferred to the PLC by fieldbus command. Inputs: 12...28 VDC, 10 mA.

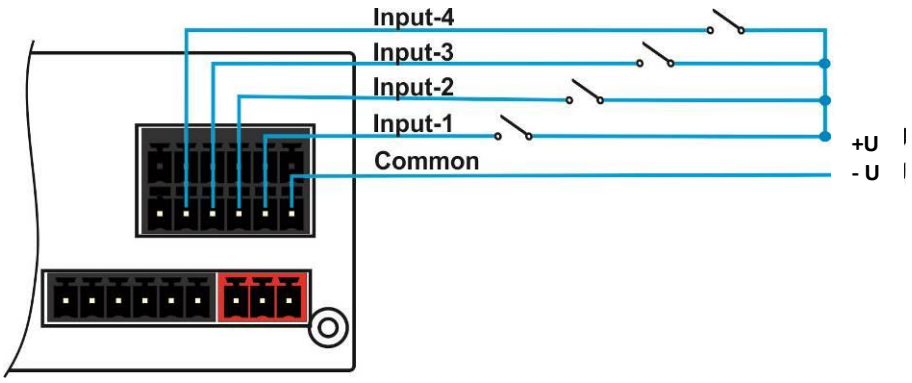


Inputs connection diagram is shown in Figure 4.14.



FT-10 P

If the ports are programmed as a digital input, they can be programmed for Taring/Clear or for Zeroing. The inputs are non-isolated, common groud, 12…28VDC, 10mA.

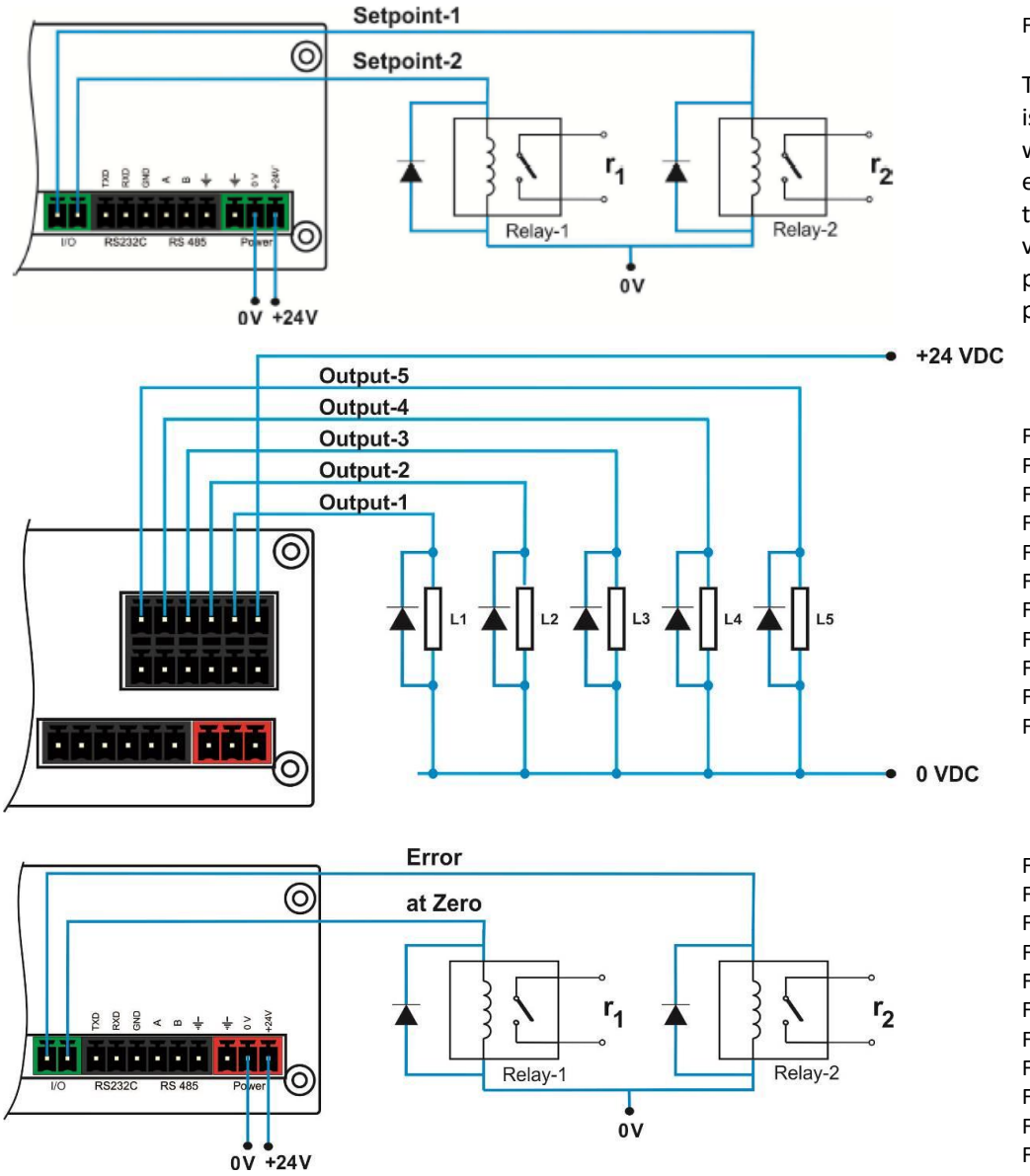


FT-10 IO
FT-10 MB,
FT-10 AN
FT-10 PB,
FT-10 PN,
FT-10 EN,
FT-10 CO
FT-10 EI,
FT-10 EC,
FT-10 CC
FT-10PL

Figure 4.15 - FT-10 Inputs connection diagram

3.3.15 Digital Outputs

FT-10 instruments digital outputs can be used as a standard, threshold and window. Threshold and window outputs are also programmable with positive or negative polarity. Digital outputs of FT-10 are also programmable as a fieldbus port to control them with a fieldbus commands. Refer to parameter **[117 x]**, [**130 x**] on Page 38 and [**70-**] on Page 45. Outputs: 250 VAC or 30 VDC, 1A.
Outputs connection diagram is shown in Figure 4.16



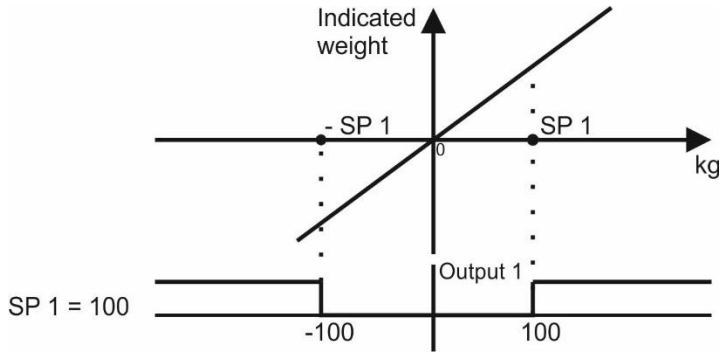
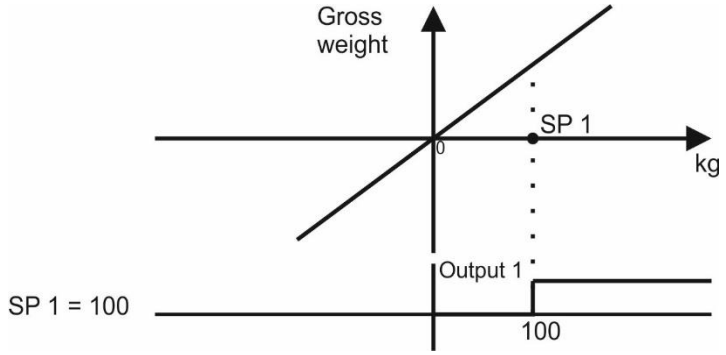
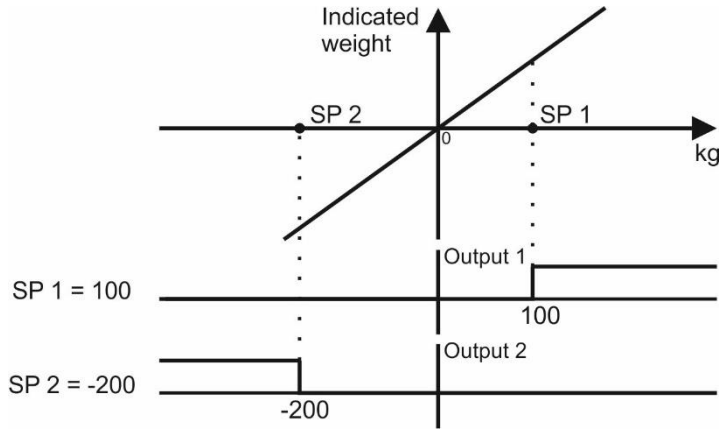
FT-10 P

The output state is high when the weight value is equal and bigger than setpoint value entered par. [138] and par [139].

FT-10 IO,
FT-10 MB,
FT-10 AN
FT-10 PB,
FT-10 PN,
FT-10 EN,
FT-10 CO
FT-10 EI,
FT-10 EC,
FT-10 CC
FT-10PL

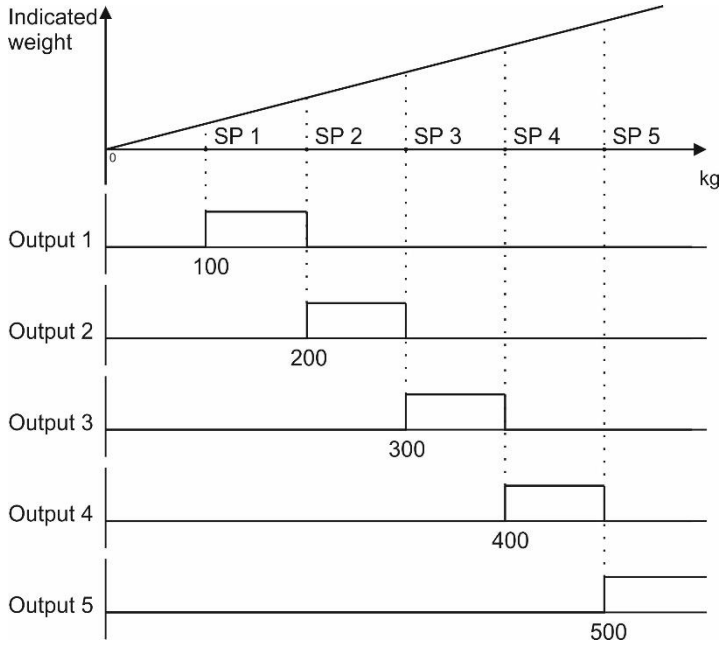
FT-10 AN
FT-10 IO,
FT-10 MB,
FT-10 PB,
FT-10 PN,
FT-10 EN,
FT-10 CO
FT-10 EI,
FT-10 EC,
FT-10 CC
FT-10PL

Figure 4.16 - FT-10 Outputs connection diagram

Setpoint of absolute indicated weight The absolute indicated weight value is compared with the setpoint entry and the output state is activated if the absolute weight is higher than setpoint. Refer to parameter [**130**] on Page 38.	
Setpoint of gross weight The output state is activated during the heavier gross loadings at gross or net weight indications. This feature can be used to produce alarm signal at empty or over weighted scales, tanks etc. Refer to parameter [**130**] on Page 38.	
Setpoint of real indicated weight The + or - sign of the setpoint can be entered. The output signal is produced if; Positive setpoint: The output is activated if the weight is heavier than the loading. Refer to setpoint 1 in the drawing. Negative setpoint: The output is activated if the negative net weight is lighter than the setpoint. Refer to setpoint 2 in the drawing. To enter the negative or positive value, long press < **Tare** > key while the set point value is seen on the display. Refer to parameter [**130**] on Page 38.	

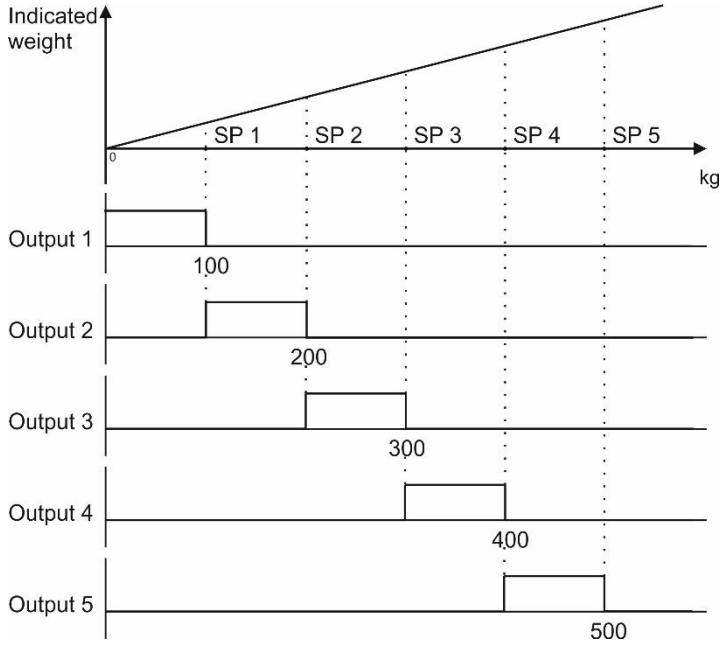
Control Mode-1:
Setpoints are entered as
SP1<SP2<SP3<SP4<SP5
and outputs are activated as indicated in the drawing as seen on the right. This mode can be used for checkweighing, sorting, filling, multicomponent batching etc.

Refer to parameter [**130**] on Page 38.

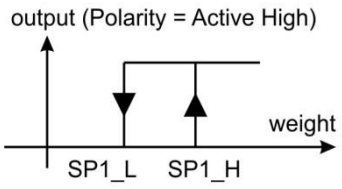


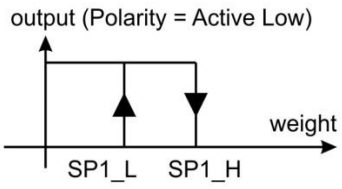
Control Mode-2:
Setpoints are entered as
SP1<SP2<SP3<SP4<SP5
and outputs are activated as indicated in the drawing as seen on the right. This mode can be used for checkweighing, sorting, filling, multicomponent batching etc.

Refer to parameter [**130**] on Page 38.

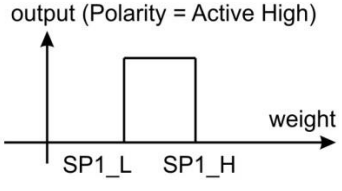


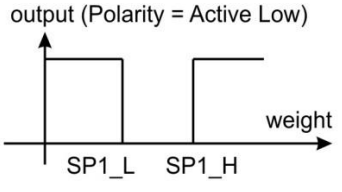
Threshold Output:
2 set point values are entered. SP1 is the point that the output goes active when the weight increased from SP1_H. SP1_L is the point that the output drops to passive state when the weight decreased to SP1_L. Inverse function is available.
Refer to parameter [**7--**] on Page 45.

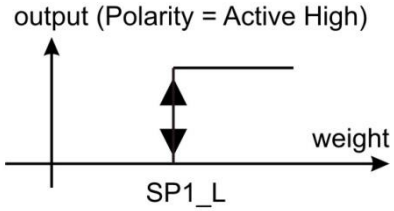
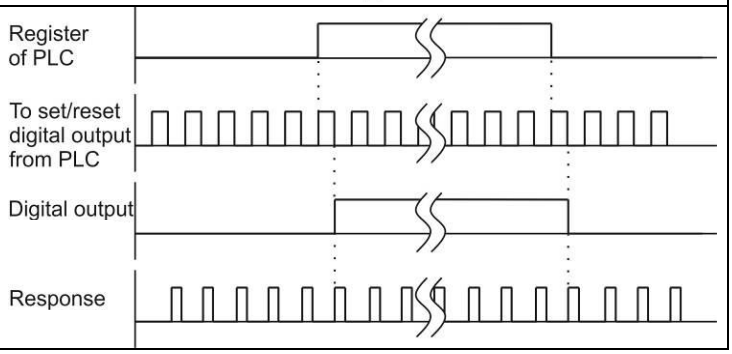




Window Output:
2 set point values are entered. The output is active when the weight is between SP1_L and SP1_H. Inverse function is available. Refer to parameter [**7--**] *on* Page 45.





Standard Output: Only one set point value is entered. The output state is forced active high when the weight is higher than SP1, else the output is passive. Refer to parameter [**130**] on Page 38.	
PLC remote port The digital output is used as a remote port of the PLC if the output is programmed as fieldbus port. The PLC sends the command to set the status of the digital output. The output status is latched in the weighing instrument until receiving the following command as shown in the drawing. Refer to parameter [**130**] and [**7--**],Page 45.	

3.4 Commissioning

PRECAUTION: *Please read this manual carefully before energizing the instrument. Perform the commissioning operation according to the procedure given in this section. Only trained person is allowed for cleaning, commissioning, checking, and servicing of the instrument. The interference of untrained person may cause some unwanted damages or injuries.*
Before power on the instrument, please make the required mechanical and electrical installations. After power on, you must program your FT-10 before field bus interfacing.

Install IndFace1X to your PC. IndFace1X software is used for easy programming, calibration, and testing of FT-10 instruments.

4 PROGRAMMING AND CALIBRATION

In this section you will find the programming and calibration procedure of FT-10 indicator according to your application. The signs those take place on the lower right corner of the keys indicate the function of the keys in programming menu. The basic meanings of these keys are given the table below.

				
Exit without saving	Advancing next parameter	Select the digit will be changed	Changing parameter value or increasing the blanking digit	Enter

4.1 Entering the Programming and Calibration

There is a DIP switch on the rear side of FT-10 and its position should be “ON” (downwards) to change the metrological related parameters including calibration. There is no need to open the housing to change the position of this DIP switch. If there is not set-up DIP switch on the instrument for industrial usage, its position is always ON.

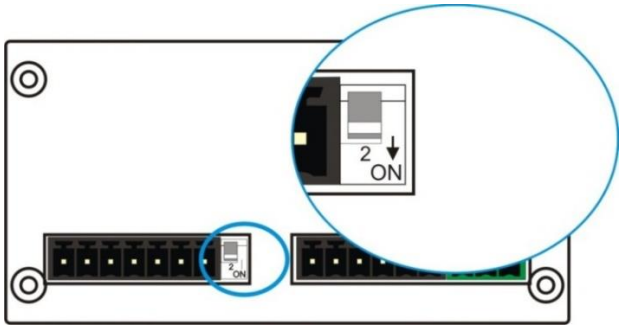


Figure 4.1 - The location of calibration DIP switch

Display	**Operation**
[123.456 kg]	Press F key until [**PASSWr**] prompts seen.
[PASSWr]	Press G/N + →0← + G/N keys sequentially.
[---]	Press key for confirm.
[0--]	First block of Programming menu.

Programming and Calibration menus consist of main blocks which are shown as [**X--**] and sub-blocks. By using G/N key you can reach next main blocks. After reaching the desired main block, you can get in by pressing key. As you enter the block you will reach the first sub-block in that main block. The sub-block address will be seen on the display as [**X0-**]. You can also search between the sub-blocks by using G/N key and reach the first parameter of the sub-block seen on the display by key. The number of the parameter comes on display as [**XY0**]. Again you can search between parameters by G/N key. For entering numerical value in the parameters, press the key to select the digit and press the →0← key the change the value.

4.2 Fast Access to the Calibration

The instrument has fast access calibration feature to earn time to the service technician. If only the calibration adjustment is needed, follow the steps below to access the calibration parameters fast.

Display	Operation
[123.456 kg]	Press F key until [**PASSWr**] prompts seen.
[PASSWr]	Press →0← + →0← + →0← keys sequentially.
[---]	Press ⊙ key for confirm.
[310]	Zero Adjustment parameter.
“Calibration”	Press ⊙ key to start zero adjustment. Or press G/N key to access span calibration without zero adjustment.

4.3 Exiting the Programming and Calibration

If you press F key on which parameter you are, you will get out of the active sub-block and reach the next sub-block. If you press F key again, you will get out of the active block and reach the next main block. If you press F key once again, the [**SAvE**] message appears on the display.

- Here you can press ⊙ key to save the changes into the memory,
- or you can press ◇→ key to store the changes until the power goes off,
- or you can press F key to abort changes.

[**Wait**] message will be seen on the display for a short time, and automatically get back to weighing mode.
Especially for legal metrological usage, please don’t forget to turn the power off and switch the calibration DIP to “OFF” position to start the operation.

4.4 Programming

4.4.1 Serial Port, Printer and Fieldbuses

[0--] Interface Block

You can reach the parameters about serial interface of FT-10 indicator in this section. The data output modes can be used once except continuous data output.

[00-] RS 232C Serial Port

This sub-block includes the parameters about the 1st serial interface of FT-10.

[000 3] Data Format

0 : No data transfer
1 : Continuous data output (*) (*Page 47*)
2 : Print mode (*Parameter [040]* *(Page 35*)
3 : BSI command set (*Page 48*)
4 : Modbus RTU High-Low (*Page 57*)
5 : Modbus RTU Low-High (*Page 57*)
6 : Fast continuous mode (*Page 47*)

(*)* Warning *: *Use for Flintec remote displays interfacing. CR and LF should be enabled.*

[001 3] Baud Rate

0 : 1200 Baud 1 : 2400 Baud 2 : 4800 Baud
3 : 9600 Baud 4 : 19200 Baud 5 : 38400 Baud
6 : 57600 Baud 7 : 115200 Baud

[003 00] Address

You can define a device address between 1 and 99 by this parameter. If you enter 0, indicator will operate without an address.

[004 0] Data length and parity

0 : 8 bit, no parity 1 : 7 bit, odd parity 2 : 7 bit, even parity
3 : 8 bit, odd parity 4 : 8 bit; even parity

[005 0] Checksum

You can enable or disable for continuous data format and BSI command set.

0 : No checksum 1 : Checksum enable

[006 1] Carriage return

You can enable or disable for continuous data format.

0 : No CR 1 : CR enables (**C**arriage **R**eturn)

[007 1] Line feed

You can enable or disable for continuous data format.

0 : No LF 1 : LF enables (**L**ine **F**eed)

[008 0] Response Speed

0 : Modbus RTU Answer is sent immediately after Request is received.
1 : Modbus RTU Answer is delayed 20 ms after Request is received.
This property is very helpful for slow PLC systems

[01-] RS 485 Serial Interface

This sub-block includes the parameters about the 2nd serial interface of FT-10.

[010 5] Data Format

0 : No data transfer
1 : Continuous data output (*) (*Page 47*)
2 : Print mode (*Parameter [040]* (*Page 35*)
3 : BSI command set (*Page 48*)
4 : Modbus RTU High-Low (*Page 57*)
5 : Modbus RTU Low-High (*Page 57*)
6 : Fast continuous mode (*Page 47*)

(*)* Warning *: *Use for Flintec remote displays interfacing. CR and LF should be enabled.*

[011 3] Baud Rate

0 : 1200 Baud 1 : 2400 Baud 2 : 4800 Baud
3 : 9600 Baud 4 : 19200 Baud 5 : 38400 Baud
6 : 57600 Baud 7 : 115200 Baud

[013 01] Address

You can define a device address between 1 and 99 by this parameter. If you enter 0, indicator will operate without an address.

[014 0] Data length and parity

0 : 8 bit, no parity 1 : 7 bit, odd parity 2 : 7 bit, even parity
3 : 8 bit, odd parity 4 : 8 bit; even parity

[015 0] Checksum

You can enable or disable for continuous data format and BSI command set.

0 : No checksum 1 : Checksum enable

[016 1] Carriage return

You can enable or disable for continuous data format.

0 : No CR 1 : CR enables

[017 1] Line feed

You can enable or disable for continuous data format.

0 : No LF 1 : LF enables

[018 0] Response Speed

0 : Modbus RTU Answer is sent immediately after Request is received.
1 : Modbus RTU Answer is delayed 20 ms after Request is received.
This property is very helpful for slow PLC systems

[03-] Ethernet (Only FT-10 EN)

This sub-block includes the parameters related with the Ethernet of FT-10 indicator.

[030 4] Data Format

0 : No data transfer
1 : Continuous data output (*Page 47*)
2 : Print mode (*Parameter [040]* (*Page 35*)
3 : BSI command set (*Page 48*)
4 : Modbus TCP High-Low (*Page 72*)
5 : Modbus TCP Low-High (*Page 72*)
6 : Fast continuous mode (*Page 47*)

[031 01] Device Address

The address of FT-10 will be entered between 01 to 255.

[032] IP Address

The IP address will be entered as ” aaa.bbb.ccc.ddd ”. **Default is** “192.168.16.250”.

For changing the IP address, press the <  > key and enter the first 3 “a” digits of the IP address. Press <  > key to access the following “b”, “c” and “d” address entries.

Press the <  > key to access the next parameter.

[033] Subnet Mask Address

The IP address will be entered as ” aaa.bbb.ccc.ddd ”. **Default** is “255.255.255.000”.

For changing the IP address, press the <  > key and enter the first 3 “a” digits of the IP address. Press <  > key to access the following “b”, “c” and “d” address entries.

Press the <  > key to access the next parameter.

[034] Gateway Address

The IP address will be entered as ” aaa.bbb.ccc.ddd ”. **Default** is “192.168.16.253”.

For changing the IP address, press the <  > key and enter the first 3 “a” digits of the IP address. Press <  > key to access the following “b”, “c” and “d” address entries.

Press the <  > key to access the next parameter.

[035] Local Port

The local port will be entered between 00001 to 65535. **Default** is “502”.

[036 0] Response Speed

0 : Modbus TCP Answer is sent immediately after Request is received.
1 : Modbus TCP Answer is delayed 20 msec after Request is received.
2 : Modbus TCP Answer is delayed 50 msec after Request is received.
This property is very helpful for slow PLC systems

[04-] Printer

If one of the serial interfaces is selected as printer, the label settings will be made in his sub-block.

[040 2] Print Out Format

1 : Single line (*Page 48*)
2 : Multi line-1 (*Page 48*)
3 : Multi line-2 (*Page 48*)

[041 1] CN (Consecutive Number)

0 : The “Consecutive Number” will not be located on the printout.
1 : The “Consecutive Number” will be located on the printout.

[042] Minimum Print

[XXXXXX] If the weight is less than the value entered here, the data will not be printed.

[043 0] Print Method

0 : Printing via key  .
1 : Auto print.
2 : Print interlock

Explanation: *If this parameter is selected as auto print, the data will automatically be printed when the data exceeds minimum print value and becomes stable. The weight value should decrease under minimum print value to reprint. If this parameter is selected as print interlock, after printing the weight must be changed to reprint.*

[044 XY] Line Feed before Printing

X=0,1 : 0 means the forward feeding and 1 means the backward feeding.
Y=0,1,2….9 : Enter the number of the feed lines before data printing

[045 XY] Line Feed after Printing

X=0,1 : 0 means the forward feeding and 1 means the backward feeding.
Y=0,1,2….9 : Enter the number of the feed lines after data printing

[046 0] Form Feed

0 : No Form Feed
1 : After printing, the printer will go to next page automatically.

[047 3] Space on the left

Here you can enter the number to shift the printout to the right on the paper.
Available values are from 0 to 9.

[048 1] Quantity of Copies

X = 1,2….9 : Enter the label quantity for each weighing.

Note: *This function is valid only for 040 = 2 or 3.*

[05-] Profibus (Only FT-10 PB)

This sub-block includes the parameters related with the Profibus interfaces of FT-10 indicator.

[050 0] Data Format

0 : Signed 32 bit integer, no decimal point implied
1 : 32 bit float, decimal point implied

[051 000] Rack Address

The Profibus rack address of FT-10 will be entered via keypad between 001 to 126.

***Note**: After the address is changed, the device must be re-booted*

[06-] Profinet, EtherNet/IP or EtherCAT (Only FT-10PN, EI, EC)

[060 0] Data Format

0 : Signed 32 bit integer, no decimal point implied
1 : 32 bit float, decimal point implied

[07-] CANopen, CC-Link or Powerlink (Only FT-10CO, CC, or PL)

[070 0] Data Format

0 : Signed 32 bit integer, no decimal point implied
1 : 32 bit float, decimal point implied

[071 000] Rack Address

The CANopen rack address of FT-10 will be entered via keypad between 001 to 126.

[072 000] Baudrate (only FT-10CC)

0 : 156kbps 1 : 625kbps 2 : 2.5kbps
3 : 5Mbps 4 : 10Mbps

4.4.2 Configuration Block [1--]

In this block the parameters take place which are being used to set FT-10 according to your application.

[11-] Start Up

[112 1] Tare Memory

0 : No. 1 : Tare value is stored at power off.

Note: *The parameter [**202**] must be selected as 0 to store Tare at power off.*

[113 0] Auto Clear Tare

0 : No. 1 : The scale gets back to gross mode after unloading.

[115] Key lock

[ABCDE] When the key lock function is activated, the key(s) programmed as 1 in this parameter is (are) locked (*Page 11*).

A: - B: 

C: 

D: 
E: 

[116 1] Function key

This 

key function is programmed as;

0 : No any 1 : Increased Indication 2 : Total
3 : Tare value indication 4 : CN value indication 5 : Hold function
6 : Peak function

Explanation: *If this parameter is selected as total, to clear the total weight, you need to press <* 

*> key while the total value is shown on the display and [**All C**] will appear on the display. You can confirm the deletion by pressing <* 
> key or cancel by pressing < 

> key.

[117 0] Zero Range Output

0 : Active if weight value is in gross zero (-1e < W_G < +1e)
1 : Active if indicated weight value is zero (-1e < W < +1e)
2 : Active if indicated weight value is in centre of zero (-0,25e < W < +0,25e)

[12-] Filter

In this block the proper filter values according to the operating conditions can be entered. One of the most important features of FT-1x series is viewing filter characteristic on the display and with the help of this option, you can select the most suitable filter without exiting the programming mode.

[120 7] Filter

The filter value can be selected from 1(fastest) to 9. Recommended minimum value of the filter is 7 in at common weighing applications. As you enter this parameter and press < 
> key while [**120 X**] seen on the display, the weight variation can be seen on the display. The value of the filter can be changed by using < 

> key and the weight variation for every value can be seen on the display. After finishing the filter selection you can go to next step by pressing the < 

> key.

4.4.3 Parallel Inputs and Outputs [13-]

FT-10xx has an optional 4 parallel inputs and up to 5 parallel outputs.

[130 0] Outputs (only for FT-10IO, FT-10MB, FT-10AN, FT-10PB, FT-10PN, FT-10EN and FT-10CO, FT-10EI, FT-10EC, FT-10CC, FT-10PL)

The outputs operate with respect to the weight value seen on the display.

0 : No.
1 : (Output1 = Sp1), (Output2 = Sp2), (Output3 = Sp3), (Output4 = Sp4), (Output5 = Sp5)
2 : (Output1 = Sp1), (Output2 = Sp2), (Output3 = Sp3), (Output4 = Sp4), (Output5 = Stable)
3 : (Output1 = Sp1), (Output2 = Sp2), (Output3 = Sp3), (Output4 = Sp4), (Output5 = Error)
4 : (Output1 = Sp1), (Output2 = Sp2), (Output3 = Sp3), (Output4 = Sp4), (Output5 = Center of Zero)
5 : Functional outputs (Refer to [**7--**] parameter group on Page 45)
6 : Setpoint for numeric indicated weight (Refer to Page **Fehler! Textmarke nicht definiert.**)
7 : Setpoint of gross weight (Refer to Page **Fehler! Textmarke nicht definiert.**)
8 : Control mode-1 (Refer to Page 45)
9 : Control mode-2 (Refer to Page 45)

[131 0] Input 1 (only FT-10IO, FT-10MB, FT-10 AN, FT-10PB, FT-10PN, FT-10EN and FT-10CO, FT-10EI, FT-10EC, FT-10CC, FT-10PL)

0 : Not used 1 : Zero 2 : Tare 3 : Clear 4 : Print
5 : Key lock 6 : Hold during active 7 : Peak during active
8 : Field bus input

[132 0] Input 2 (see Input 1)

[133 0] Input 3 (see Input 1)

[134 0] Input 4 (see Input 1)

[137 0] Digital I/O Output polarity (only FT-10, FT-10P)

This parameter determines the polarity of setpoint outputs
0 : Active low 1 : Active high

[138 0] Digital I/O port 1 (only FT-10, FT-10P)

If this value is smaller than 999999, the port will be output and the entered value will be the cut off value (setpoint). If the entry is 999999, the port function will beTare/Clear input.
Default is “000000”.

[139 0] Digital I/O port 2 (only FT-10, FT-10P)

If this value is smaller than 999999, the port will be output and the entry value will be the cut off value (setpoint). If the entry is 999999, the port function will be Zeroing input.
Default is “000000”.

4.4.4 Entries [14-]

In this block you can enter the initial CN.

[142] Label No (CN)

[XXXXXX]

The desired value is entered via <  > and <  > keys and saved by pressing <  > key. If the number exceeds 65535, it will automatically reset and begin from 1 again.

[143 1] Display Refresh Rate

0 : 60ms 1 : 100ms 2 : 200ms 3 : 300ms 4 : 400ms
5 : 500ms 6 : 600ms 7 : 700ms 8 : 800ms 9 : 900ms

4.4.5 Scale Block [2--]

[20-] Set Up

[200 0] Approved

0 : No 1 : OIML(*) 2 : Hopper and Tank (**)

(*) Warning: *Scale type cannot be programmed to force mode if OIML is selected.*

(* *) Warning: *Taring, Zero Tracking, Power on zeroing etc. functions disabled.*

[201 0] Increased Indication

0 : by pressing key 1 : Always increased indication

[202 0] Power On Zero

According to the selection below, during power on, if the weight is in the defined percentage of the capacity, the scale will automatically be zeroed. During the process **[Pllr2Er]** message (=Power Zero) will be shown. If the weight is not in zeroing range, the display will show [**E E E**] message until pressing <  > key.

0 : Disable 1 : ± 2% 2 : ± 10%

[203 3] Zeroing Range

0 : Disable 1 : ± 2% 2 : ± 20% 3 : ±50%

[204 0] Auto Zero Tracking

AZT automatically readjusts the scale to zero for compensating selected small deviation per second around centre of zero.

0 : Disable 1 : ± 0,5e 2 : ± 1e 3 : ± 3e

[205 1] Tare

0 : Disabled
1 : Multi tare via key
2 : Tare via key if scale is in gross mode

[206 2] Motion Detector

This parameter defines the sensitivity level which will determine what is considered as stable.

0 : ± 0,3e 1 : ± 0,5e 2 : ± 1e 3 : ± 2e 4 : : ± 4e

[207 0.3] Stability Period

If the scale is stabile during this time, the scale is accepted as a stabile to process zeroing, tare, print etc. commands. It can be entered up to 9.9 sec.

[21-] Scale Build

The capacity and the resolution of the scale will be defined here.

[210 0] Operation mode

0 : Weighing (unipolar)
5 : Force (bipolar)

You will reach the next parameter by pressing the  key.

[212] Capacity

Press  key to reach this parameter.

[CAP] [XXXXXX]

Enter the capacity of the scale via  and  keys and confirms the value with pressing  .

[d] [XXXXXX]

Display resolution will be selected by  key and confirmed with  key.

[214 1] Unit

0 : g (Gram)
1 : kg (Kilogram)
2 : t (Ton)
3 : lb (Libre)
4 : klb (Kilolibre)
5 : N (Newton)
6 : kN (Kilonewton)
7 : No (without unit)

4.5 Calibration Block [3--]

The calibration of the scale will be performed here after the “Scale Build [**21**-]” is set.

[30-] Calibration

[300] Gravity

This parameter should be used in the scale that will be verified in two stages by gravity adjustment (in legal Metrologic applications). This parameter **should not be touched** in other applications.

If you enter a value in this parameter before calibration (enter 798564 for 9.798564 (six decimal digits)), this value will be assumed as the reference gravity acceleration where the first stage of the calibration performed. After calibration this parameter will be zeroed. If value of this parameter is zero, that means no gravity adjustment had been performed after calibration.
In the second stage of verification, the gravity acceleration of the place that the weighing instrument will be used should be entered (as six decimal digits. Enter 800065 for 9.800065) and exit programming by saving the changes without entering the calibration (par [**301**]).

[301] Calibration

Calibration involves emptying the scale then placing a known test weight on an empty platform and allowing the FT-10 indicator to capture values for zero and span. Calibration is performed as

1. Press  at the [**301**] prompt to start the calibration.
2. At the [**ZEro.CA**] prompt, remove any weight on the platform, then press  .
3. The terminal automatically starts to capture zero and the [**WAıt**] message indicating the operation is in progress.
4. After the [**Load**] prompt, the test weight value will be used for the calibration seen on the display as [**XXXXXX**] . If the value of the test weights that will be used is different from the value shown on the display, type the new value via  and  keys. A minimum of 20% of scale capacity is necessary for calibration; FLINTEC recommends 50 to 100%. A calibration error will result if insufficient weight is used.
5. Place the test weights or another practical weight on the scale.
6. Press  to start span calibration. [**WAıt**] message will be shown on the display 10sec while span calibration is being performed.
7. The following parameter is displayed after calibration. If any error message is announced, see page **Fehler! Textmarke nicht definiert.**.

[302] Linearity Correction

Because of the load cell nonlinearity or mechanical scale hardware, you may see nonlinearity on the scale performance. Three steps scale calibration in this parameter improve the scale performance.

1. Press  at the [**302**] prompt to start the calibration.
2. At the [**ZEro.CA**] prompt, remove any weight on the platform, then press  .
3. The terminal automatically starts to capture zero and the [**WAıt**] message indicating the operation is in progress.
4. At the [**Load 1**] prompt, the test weight value will be used for the first step calibration seen on the display as [**XXXXXX**] . If the value of the test weights that will be used is different from the value shown on the display, type the new value via  and  keys. This load value equaling between 35% and 65% of the scale's capacity. A calibration error is produced if insufficient weight is used.
5. Place the test weights or another practical weight on the scale.
6. Press  to start span calibration. [**WAıt**] message will be shown on the display 10 seconds while the first span calibration is being performed.
7. At the [**Load 2**] prompt, the test weight value will be used for the second step calibration seen on the display as [**XXXXXX**] . If the value of the test weights that will be used is different from the value shown on the display, type the new value via  and  keys. Place weight on the platform equaling at least 90% of scale capacity, preferable at scale capacity as much as is practical.
8. Place the test weights or another practical weight on the scale.
9. Press  to start second step span calibration. [**WAıt**] message will be shown on the display 10 seconds while the span calibration is being performed.
10. The following parameter is displayed after calibration. If any error message is announced, see page 97

[31-] Adjustment

In this sub-block you can only perform zero adjustment or span adjustment without full calibration operation.

[310] Zero Adjustment

This parameter is only being used for refreshing the zero level of the scale to prevent wrong weightings from zero drifts.

1. Press  at the [**310**] prompt to start the zero adjustment.
2. At the [**ZEro.CA**] prompt, remove any weight on the platform, then press  .
3. The terminal automatically starts to capture zero and the [**WAıt**] message indicating the operation is in progress.
4. The following parameter is displayed after calibration. If any error message is announced, see page 97

[311] Span Adjustment

This parameter lets you to perform span adjustment.

1. Press <  > at the [**311**] prompt to start the span adjustment.
2. At the [**XXXXXX**] prompt, the test weight value will be used for the calibration seen on the display. If the value of the test weights that will be used is different from the value shown on the display, type the new value via tare and zero keys. A minimum of 20% of scale capacity is necessary for calibration; FLINTEC recommends 50 to 100%. A calibration error will result if insufficient weight is used.
3. Place the test weights or another practical weight on the scale.
4. Press  to start span calibration. [**WAıt**] message will be shown on the display 10 s while span calibration is being performed.
5. The following parameter is displayed after calibration. If any error message is announced, see page 97

[312] Span Adjustment Under Load

This parameter is being used to perform span adjustment of a scale without lifting the load on it. This operation especially used for span adjustment for filled tanks. You can make span adjustment without emptying the tank.

1. Press  at the [**312**] prompt to start the span adjustment under load.
2. [**P.ZEro**] prompt appears on the display to indicate the scale load will be determined as temporary zero.
3. Press  key and the display will show [**WAıt**] message during temporary zero adjustment.
4. Shortly after a message [**LoAd**] and then [**XXXXXX**] will appear on the display as suggested test weight for calibration. If the value of the test weights that will be used is different from the value shown on the display, type the new value via  and  keys.
5. Place the test weights or another practical weight on the scale.
6. Press  to start span calibration. [**WAıt**] message will be shown on the display 10 seconds while span calibration is being performed.
7. The following parameter is displayed after calibration. If any error message is announced, see page 97

[313] eCal Calibration

Warning: *The scale capacity and increment shall be entered before performing eCal.*

This parameter lets you to perform calibration without using any test weights. FT-10 A/D coefficients are adjusted in production for increasing eCal accuracy. The calibration coefficients are calculated by scale capacity, total load cell capacity, load cell full scale output, and estimated dead load. If the conditions are convenient for zero calibration, you may perform automatic zero adjustment instead of entering estimated preload. Press  key to start eCal.

[LC.CAP] [XXXXXX]

Enter total load cell capacity via  and  keys and press  key to go to the next step.
Example : If the weighing system has 4 pcs 1000 kg load cell, enter 4000.

[LC.oUt] [XXXXXX]

Enter load cell output in mV/V via  and  keys. If the weighing system has more than one load cell, calculate the mean value of load cells outputs mV/V indicated on the certificates of the load cells. Press  key to go to the next step.
Example: If load cell outputs are LC1: 2.0010, LC2: 1.9998, LC3:1.9986 and LC4:2.0002, the mean value will be
Mean of LC outputs = (2.0010 + 1.9998 + 1.9986 + 2.0002) ÷ 4 = 1.9999 mV/V.

[ZEr.AdJ] [XXXXXX]
If the scale is empty and you want to make automatic zero adjustment instead of entering estimated dead load (see next step), press  key. After [**Zero.CA**] appears, press  key for starting zero adjustment. The display will show [**WAit**] message during zero adjustment. In this while the scale must be unloaded and stable. Approx. 10 sec later eCal calibration is performed.

If the scale is not empty or you prefer to enter estimated preload value, press the  key.

[PrE-Ld] [XXXXXX]

Enter the dead load value of the weighing system in current unit by using  and  keys. Press the  key to go to the next step.

Note: *If you want to make zero adjustment after entering estimated preload value, empty the scale, change the preload value as (estimated value + display value at empty scale) or enter parameter [**310**] for zero adjustment.*

[32-] Adjustment with Coefficients

[320] Zero Coefficient

This coefficient is determined the zero point of the scale. Enter the new value via <  > and <  > keys and press <  > key to go to the next step. You may compensate zero drifts by increasing or decreasing this coefficient.

[321] Test weight Value

The test weight used at the calibration is indicated here. Enter the new value via <  > and <  > keys and press <  > key to go to the next step.

[322 Gain Coefficient

This coefficient is related with the gain factor of the scale. Enter the new value via <  > and <  > keys and press <  > key to go to the next step.

4.5.1 Analogue Output Block [4--] *(Only FT-10 AN)*

[40-] Signal Selection

[400 0] Analogue Output Mode

0 : 4 – 20 mA 1 : 0 – 20 mA
2 : 0 – 5 VDC 3 : 0 – 10 VDC

[401] Set Analogue Output to calibration range

Press Enter key. [**Ld dEf**] message appears on the display. Press  key for loading default values or press  key to go next sub block.

[401 0] Source of the analogue output

0 : Gross weight 1 : Indicated weight

[41-] Zero Adjustment

[410] Coarse Zero Adjustment

The coarse zero adjustment is being performed by pressing  key one after another to increase the analogue signal level or  key to decrease the analogue signal level.

[411] Fine Zero Adjustment

The fine zero adjustment is being performed by pressing  key continuously one after another to increase the analogue signal level or  key to decrease the analogue signal level.

[42-] Span Adjustment

[420] Coarse Span Adjustment

Coarse span adjustment is being performed by pressing  key continuously one after another to increase the analogue signal level or  key to decrease the analogue signal level by taking the full capacity value as reference without placing any weight.

[421] Fine Span Adjustment

Fine span adjustment is being performed by pressing  key one after another to increase the analogue signal level or  key to decrease the analogue signal level by taking the full capacity value as reference without placing any weight

[44-] Adjustment with Coefficients

[440] Zero Coefficient

This coefficient is determined the zero point of the analogue signal level. Enter the new value via <  > and <  > keys and press <  > key to go to the next step.

[441] Gain Coefficient

This coefficient is determined the gain point of the analogue signal level. Enter the new value via <  > and <  > keys and press <  > key to go to the next step.

4.5.2 Digital Output Functions [70-]

Warning: *The parameter [**130**] shall be program to '5' to use these functions. Refer to Page 38.*

In this block, the digital outputs are programmed for the functions indicated in the table below.

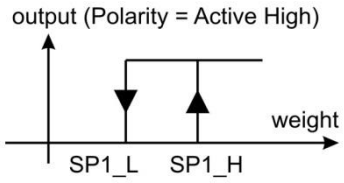
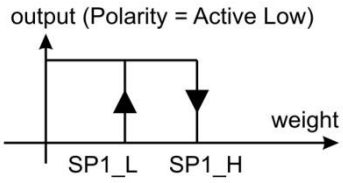
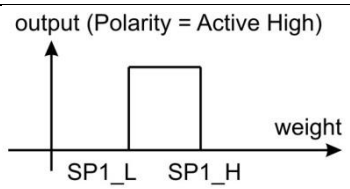
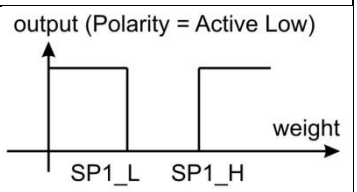
Threshold Output 2 set point values are entered. SP1 is the point that the output goes active when the weight increased from SP1_H. SP1_L is the point that the output drops to passive state when the weight decreased to SP1_L. Inverse function is available.		
Window Output 2 set point values are entered. The output is active when the weight is between SP1_L and SP1_H. Inverse function is available.		

Table 4.1 - Digital output functions

Press  **key for 3seconds in order to setup the parameters.**

[700 0] Output 1

Refer to Table 4.1 to select the output function.

0 : No function on output 1
1 : Threshold (Active High)
2 : Threshold (Active Low)
3 : Window (Active High)
4 : Window (Active Low)
5 : Fieldbus output

[701 0] Output 2

(see the settings for Output 1)

[702 0] Output 3

(see the settings for Output 1)

[703 0] Output 4

(see the settings for Output 1)

[704 0] Output 5

(see the settings for Output 1)

4.5.3 Metrological Data Block [8--]

The parameters of the Metrologic Registry are being entered in this section.

[80-] Legal Metrologic Records

[800] Counter

This counter increases by 1 automatically after entering the programming mode with calibration DIP switch. This counter cannot be changed manually.

4.5.4 Diagnostics [9--]

[90-] Tests

[900] Key Pad testing

In this step every keys ASCII code will be shown on the display as you press the related key. By this way you can test if all the keys are functional or not. Pressing <G/N> key will take you to the next parameter.

[901] RS 232C Serial Interface testing

The characters in the alphabet will sequentially be transferred from RS 232C serial interface port by pressing <→0←> key one after another. Received numerical data is seen on display.

[902] RS 485 Serial Interface testing

The characters in the alphabet will sequentially be transferred from RS 485 serial interface port by pressing <→0←> key one after another. Received numerical data is seen on display.

[903] Parallel Inputs

[I X Y] To perform parallel input test, enter its number to Y digits via <→0←> key. X shows the logical condition of that input.

[904] Parallel Outputs

[o X Y] To perform parallel output test, enter its number to Y digits via <→0←> key. Change the logical condition of that output via <→T> key and X shows the logical condition of that output.

[905] mV Indication

As you press <↵> key the output voltage of the load cell will be shown on the display. This uncalibrated value is only for test / service purposes.

[91-] Firmware Information

[910] Version of Option Board

[XX.YY] The format of the version is XX.YY. XX digits are major version number and YY digits are minor version number for firmware changing.

[92-] Log Book

[920] Error history

[Err XX]The last 20 errors. Press <G/N> key to access the previous error log.

[921] Setup history

[SErVICE] The last 20 service entries. Press <G/N> key to access the previous entry log.

[99-] Printing Parameter Values

[990] Print All Parameters

By pressing <↵> key the whole parameters can be printed.

[991] Load Default

Press <↵> key. [**Ld dEf**] message appears on the display. Press <→T> key for loading default parameter values or press <F> key to go [**9-**] sub block.
The scale build parameters and calibration is not changed.

5 SERIAL DATA OUTPUTS

FT-10 indicator family has different kind of serial interfaces like RS 232, RS 485 and Ethernet etc. In this section, you find the data structure of different type of the data outputs via these serial ports except field bus interfaces. You will find detailed information on field bus interfacing in the related sections.

5.1 Continuous Data Output

Continuous data output of the instrument is transmitted in the following data structure. The serial ports of FT-10 are suitable for bi-directional communication. If you transmit ASCII codes of **P(print), Z(zero), T(tare)** or **C(clear)** letters to the serial port of FT-10; the indicator will act like the related keys are pressed.
CR (Carriage return) and LF (Line feed) codes can be enabled or disabled from response, but they must be sent to end of ASCII command.
CHK (Checksum) can be enabled or disabled from both command and response and only continuous data output can be programmed for more than one interface.

The data format of continuous data output is;

	Status			Indicated						Tare								
STX	STA	STB	STC	D5	D4	D3	D2	D1	D0	D5	D4	D3	D2	D1	D0	CR	LF	CHK

The including of the status bytes STA, STB and STC are:

Definition Table for Status A (STA)									
Bits 0, 1 and 2				Bits 3 and 4			Bit 5	Bit 6	Bit 7
0	1	2	Decimal point	3	4	Increment size	Always 1	Always 1	X
0	0	0	XXXXOO	1	0	X 1			
1	0	0	XXXXXO	0	1	X 2			
0	1	0	XXXXXX	1	1	X 5			
1	1	0	XXXXX.X						
0	0	1	XXXX.XX						
1	0	1	XXX.XXX						
0	1	1	XX.XXXX						
1	1	1	X.XXXXX						

Definition Table for Status B (STB)		
Bit 0	0 = Gross	1 = Net
Bit 1	0 = Weight positive	1 = Weight negative
Bit 2	0 = No Error	1 = Error
Bit 3	0 = Stable	1 = Unstable
Bit 4	Always = 1	
Bit 5	Always = 1	
Bit 6	0 = Not power on zeroed	1 = Zeroed with power on zero
Bit 7	x	
Definition Table for Status C (STC)		
Bit 0	Always 0	
Bit 1	Always 0	
Bit 2	Always 0	
Bit 3	Always 0	
Bit 4	Always 1	
Bit 5	Always 1	
Bit 6	Always 0	
Bit 7	x	

CHK (Checksum) = 0 – (STX + STATUS A + ... + LF)

Error Messages: UNDER, OVER, A.OUT, L-VOLT, H-VOLT, are represented in Indicated data fields.

Note: *The weight data is represented with right aligned and the error messages are represented with left aligned.*

5.2 Fast Continuous Data Output

Fast continuous “indicated weight” data output can be used only for the instruments which can communicate fast. The output rate

is related with the baud rate. Use higher baud rate for faster data rate. Received ASCII codes of **P(print), Z(zero), T(tare)** or **C(clear)** letters, the indicator will act like the related keys are pressed. CR and LF can be enabled in the related parameter.

The data format of the fast continuous data output is;
[STX][STATUS][SIGN][WEIGHT VALUE][CR][LF]

Examples :

S+000123.4 (weight is stable and 123.4)
D+000123.4 (weight is dynamic and 123.4)
+ (Over load)
- (Under load)
O (ADC out error)

5.3 Print Mode

The format of the data output in Print mode can be selected in 3 different type forms in the parameter group [**04-**] . Only continuous format is available in more than one interface.

Single Line

You can send the data in single line like below by pressing < > key.

CN: 21 G: 3.000kg T: 1.000kg N: 2.000kg

CN				GROSS				TARE				NET				
MSD		LSD	SP	MSD		LSD	SP	MSD		LSD	SP	MSD		LSD	LF	CR
9			3	13			3	13			3	13			1	1

Multi Line

You can send the data in multiple lines as seen in the label given below by pressing < > key. The data output structure can be programmed with printer parameters.

```
CN      :   69
GROSS     74.250 kg
TARE      12.000 kg
NET       62.250 kg
```

Multi Line-1 Format

```
CN :   69
G  :  74.250 kg
T  :  12.000 kg
N  :  62.250 kg
```

Multi Line-2 Format

5.4 BSI Data Structure

All new generation FLINTEC instruments launched on the market support the standardized command set BSI data form, depending on the functionality of the instrument. This easy data format gives the reliable and speedy interface advantages with communicating PLC or PC for process control or transactional applications. You can expand your system with additional scales from FLINTEC without having to change your application program base.

General Rules:

1.	Commands are only in CAPITAL.
2.	CHK (2 ASCII char) can be enabled or disabled from both command and response.
3.	Weight data is 8-byte with dot and non-significant zeros on the left.
4.	Address (2 ASCII char) will be located in the structure, if not 00.

Command format
A general description of the command is the following:
[ADR][COMMAND][CHK][CR][LF]

Response format with weight / force
A general description of the response is the following:
[ADR][COMMAND][STATUS][SIGN][WEIGHT/FORCE][CHK][CR][LF]
Response format without weight / force
[ADR][COMMAND][STATUS][CHK][CR][LF]

Command Table:

A	Read all weight data immediately
B	Read Gross weight value immediately
C	Clear the tare memory
F	Start/stop continuous data output
G	Read voltage value of DC power supply
H	Hold
I	Read current weight (indicated) value immediately
P	Print: Read the current stable weight value
Q	Load set points
R	Read set points
S	Read Status
T	Tare
U	Read digital inputs
V	Read digital outputs
W	Set/Reset digital outputs
X	Read current weight value in increased resolution immediately
Z	Zero

Status Table:

A	Ack, the command is operated successfully
D	Dynamic, unstable weight
E	Errors except of H, L, O, +, –.
H	High voltage detected
I	The weight is in range
L	Low voltage detected
N	Nack, the command couldn't be operated
O	ADC out
S	Stable weight
X	Syntax error (not recognized the received command)
+	Overload
–	Underload

Note: *CHK, CR and LF will not be shown in below data format descriptions in this section.*

Commands and Responses:

A	Read all weight data

Command : [ADR][A]
Response : [ADR][A][STATUS][SIGN][NET W][SIGN][TARE W][SIGN][GROSS W]
Example :
Command : 01A
Response: 01AS+000123.4+000111.1+000234.5
01AD+000123.4+000111.1+000234.5

01AO (ADC out error)

Comments :The response is net, tare and gross weight values or error status.
All weight data is transmitted immediately after receiving the command.

B	Read Gross weight

Command [ADR][B]
Response : [ADR][B][STATUS][SIGN][WEIGHT VALUE]
Example :
Command 01B
Response: 01BS+000123.4 (gross weight is stable and 123.4)
01BD+000123.4 (gross weight is dynamic and 123.4)
01B– (under load)
Comments : The response is the gross weight value (stable or dynamic) or error status.
Gross weight data is transmitted immediately after receiving command.

C	Clear the tare memory

Command : [ADR][C]
Response : [ADR][C][A] (Cleared and the scale is in gross mode)
Comments : The response status is always Ack in weighing or force mode.

F	Start /stop continuous data output

Command : [ADR][F][ENABLE/DISABLE]
Response : [ADR][F][STATUS]
Example :
Command : 01F1 (Enable)
01F0 (Disable)
Response: 01FA (Command is done successfully)
01FN (Command could not be executed)
Comments : Indicated weight value sends continuously.
Continuous data format is [ADR][I][STATUS][SIGN][WEIGHT VALUE].

G	Read voltage value of DC power supply

Command : [ADR][G]
Response : [ADR][G][STATUS][VOLTAGE VALUE]

Example :
Command : 01G
Response: 01GA234 (Power supply is 23.4 VDC)
01GA150 (Power supply is 15.0 VDC)
01GA090 (Power supply is 9.0 VDC)
Comments : Voltage value is 3 byte and sends with 0.1 V increment.

H	Hold function active/passive

Command : [ADR][H][ACTIVE/PASSIVE]
Response : [ADR][H][STATUS]
Example :
Command : 01H1 (Hold the weight on display)
01H0 (Return the operation)
Response: 01HA (Command is done successfully)
01HN (Command could not be executed)
Comments :
Indicated weight is hold on display immediately.

I	Read indicated weight

Command : [ADR][I]
Response : [ADR][I][STATUS][SIGN][WEIGHT VALUE]
Example :
Command : 01I
Response: 01IS+000123.4 (weight is stable and 123.4)
01ID+000123.4 (weight is dynamic and 123.4)
01I+ (overload)
Comments : Indicated weight value (stable or dynamic) is transmitted immediately.
The weight value may be in gross or net.

P	Print :Read the stable weight

Command : [ADR][P]
Response : [ADR][P][STATUS][SIGN][WEIGHT VALUE]
Example :
Command : 01P
Response: 01PS+000123.4 (weight is stable and 123.4) or
01PN (could not print)
Comments : Checks status and it must be stable. Else Nack status is send.
Status can be Stable or Nack.

Q	Load set points

Command : [ADR][Q][SP No][SP Type][SIGN][SP VALUE]
Response : [ADR][Q][STATUS]
Example :
Command : 01Q01L+000123.4
Response: 01QA (123.4 loaded to SP1_L)
01QN (Could not loaded)
01QX (Decimal point of SP VALUE is mismatch)
Comments :
SP Number is 2 byte ASCII char. Use 01 for SP1, 02 for SP2 and 03 for SP3.
SP Type is 1 byte ASCII char. Use 'L' for SPx_L and use 'H' for SPx_H.
SP VALUE data is 8-byte ASCII char with dot and non-significant zeros on the left.

R	Read set points

Command : [ADR][R][SP No][SP Type]
Response : [ADR][R][STATUS][SIGN][SP VALUE]
Example :
Command : 01R01L
Response: 01RA+000123.4 (SP1_L is 123.4)
01RN (Could not loaded)
Comments :
SP No is 2 byte ASCII char. Use 01 for SP1, 02 for SP2 and 03 for SP3.
SP Type is 1 byte ASCII char. Use 'L' for SPx_L and use 'H' for SPx_H.
SP VALUE data is 8-byte ASCII char with dot and non-significant zeros on the left.

S	Read Status

Command : [ADR][S]
Response : [ADR][S][STATUS-1][STATUS-2][STATUS-3]
Example :
Command : 01S
Response: 01SSGI (Stable, Gross, In Range)
01SDGL (Dynamic, Gross, Low voltage error)
Comments :
The response includes 3 status information.
STATUS-1 can be **S**table or **D**ynamic.

STATUS-2 can be **G**ross or **N**et.
STATUS-3 can be '**I**n range', '**O**ut of range', '**+** Over', '**-** Under', '**L**ow voltage', '**H**igh voltage' or '**E**rrors'.

T	Tare

Command : [ADR][T]
Response : [ADR][T][A] (Taring is done successfully and scale is in net)
[ADR][T][N] (Taring could not be executed)
[ADR][T][X] (Taring is disabled)
Comments: The tare value is overwritten by the new tare weight value.
Status must be stable in 2 seconds time out delay. If so, Ack is send.
If it cannot be stable in time out delay, Nack is send.

U	Read digital inputs

Command : [ADR][U]
Response : [ADR][U][STATUS][Inputs]
Example :
Command : 01U
Response: 01UA03 (Input 2 and Input 1 are active)
01UA4296 (Input 15,10,8,5,3,2 are active)
01UAFF (All 8 inputs are active)
01UN (Could not read inputs)
Comments : Data length change according to number of digital inputs.
Inputs are implemented to ASCII char of 4-bit. '1111' inputs are implemented to char 'F'.

INPUTS	IN-16	IN-15	IN-14	IN-13	IN-12	IN-11	IN-10	IN-9	IN-8	IN-7	IN-6	IN-5	IN-4	IN-3	IN-2	IN-1
Bit wise	0	1	0	0	0	0	1	0	1	0	0	1	0	1	1	0
ASCII	4				2				9				6			

V	Read digital outputs

Command : [ADR][V]
Response : [ADR][V][STATUS][Outputs]
Example :
Command : 01V
Response: 01VA03 (Output 2 and Output 1 are active)
01VA4296 (Output 15,10,8,5,3,2 are active)
01VAFF (All 8 outputs are active)
01VN (Could not read outputs)
Comments :
Data length change according to number of digital outputs.
Outputs are implemented to ASCII char of 4-bit. '1111' is implemented to char 'F'.

OUTPUTS	OUT-16	OUT-15	OUT-14	OUT-13	OUT-12	OUT-11	OUT-10	OUT-9	OUT-8	OUT-7	OUT-6	OUT-5	OUT-4	OUT-3	OUT-2	OUT-1
Bit wise	0	1	0	0	0	0	1	0	1	0	0	1	0	1	1	0
ASCII	4				2				9				6			

W	Set/Reset digital outputs

Command : [ADR][W][Outputs]
Response : [ADR][W][STATUS]
Example :
Command : 01W4296
Response: 01WA (Outputs 15,10,8,5,3,2 are activated)
01WN (Outputs could not be activated)
Comments :
Data length change according to number of digital outputs.

OUTPUTS	OUT-16	OUT-15	OUT-14	OUT-13	OUT-12	OUT-11	OUT-10	OUT-9	OUT-8	OUT-7	OUT-6	OUT-5	OUT-4	OUT-3	OUT-2	OUT-1

Bit wise	0	1	0	0	0	0	1	0	1	0	0	1	0	1	1	0
ASCII	4				2				9				6			

Outputs are implemented to ASCII char of 4-bit. '1111' outputs are implemented to char F'.

X	Read weight value in increased resolution

Command : [ADR][X]
Response : [ADR][X][STATUS][SIGN][WEIGHT VALUE]
Example :
Command : 01X
Response: 01XS+00123.41 (weight is stable and 123.41) or
01XD+00123.41 (weight is dynamic and 123.41) or
01XE (Error)
Comments :
The response includes weight data with divided the increment to 10.

Z	Zero

Command [ADR][Z]
Response : [ADR][Z][A] (Zeroed)
[ADR][Z][N] (Zeroing could not be operated)
[ADR][Z][X] (Zeroing is disabled)
Comments :
Zero command can not work in net weighing.
Weight must be in zeroing range for all operating modes.
Status must be stable in 2 seconds time out delay. If so, Ack is send.
If it can not be stable in time out delay, Nack is send.

Checksum Calculation:
CHK is transmitted as two ASCII characters calculated with the Checksum formulation.
Checksum = 0 – (SUM of all response data before CHK)

Example: *Read stable current weight data.*

BSI Examples: (CHK is enabled and instrument address is 01)

Command: 01P[CHK][CR][LF]

Checksum = 0 − (0x30 + 0x31 + 0x50)
= 0 − 0XB1
= 0x4F
= Char ‘4’ and ‘F’

Response: 01PS+000123.4[CHK][CR][LF]

Checksum = 0 − (0x30 + 0x31 + 0x50 + 0x53 + 0x2B + 0x30 + 0x30 + 0x30 + 0x31+ 0x32 + 0x33 + 0x2E + 0x34)
= 0 − 0x02B7
= 0x49
= Char ‘4’ and Char ‘9’

6 ANALOGUE (ONLY FT-10 AN)

FT-10 AN is programmable to 4 – 20 mA, 0 – 20 mA, 0 – 5 V or 0 – 10 V analogue output types. Analogue output is automatically adjusted to the weighing range after the calibration. The mid value of the analogue output is set to zero load at bipolar usage The analogue output is related with the gross load of the scale. The analogue output signal operates as described next.

Under Zero	When the gross indication drops below zero, the analogue output reduces the analogue output to 0mA or - 4 V to indicate error on the analogue output.
Normal Range	The analog output will reflect the gross value to the programmed analogue output 4 – 20 mA, 0 – 20 mA, 0 – 5 V or 0 – 10 V.
Over High Limit	When the gross value exceeds the high limit, the analogue signal increase to approximately 24 mA or 11 V and remains there until the weight display is no longer blanked or the analogue signal returns to within range.

The following table indicates the analogue output value when the gross indication is out of the range and if there is any error indication on the display.

Condition (On Display)	**4-20 mA output**	**0-20 mA output**	**0–5 V output**	**0–10 V output**
The weight is more than the range (Over)	24 mA	24 mA	5.5 V	11 V
The weight is under the zero range (Under)	0 mA	0 mA	-4.0 V	-4.0 V
Error [Err XX]	24 mA	24 mA	5.5 V	11 V
ADC is out of operating range [Adc Out]	24 mA	24 mA	5.5 V	11 V

The error data indicated above can be used to follow the errors at PLC.

[4--] Analogue Output Block

The calibration of the analogue output is performed in this sub-block.

[40-] Signal Selection

[400 0] Analogue Output Mode

0 : 4 – 20 mA
1 : 0 – 20 mA
2 : 0 – 5 VDC
3 : 0 – 10 VDC

[401] Set Analogue Output to calibration range

Press <  > key. [**Ld dEf**] message appears on the display. Press <  > key for loading default values or press < F > key to go next sub block.

[41-] Zero Adjustment

[410] Coarse Zero Adjustment

The coarse zero adjustment is being performed by pressing <  > key one after another to increase the analogue signal level or <  > key to decrease the analogue signal level.

[411] Fine Zero Adjustment

The fine zero adjustment is being performed by pressing <  > key continuously one after another to increase the analogue signal level or <  > key to decrease the analogue signal level.

[42-] Span Adjustment

[420] Coarse Span Adjustment

Coarse span adjustment is being performed by pressing <  > key continuously one after another to increase the analogue signal level or <  > key to decrease the analogue signal level by taking the full capacity value as reference without placing any weight.

[421] Fine Span Adjustment

Fine span adjustment is being performed by pressing <  > key one after another to increase the analogue signal level or <  > key to decrease the analogue signal level by taking the full capacity value as reference without placing any weight.

[44-] Adjustment with Coefficients

[440] Zero Coefficient

This coefficient is determined the zero point of the analogue signal level. Enter the new value via <  > and <  > keys and press <  > key to go to the next step.

[441] Gain Coefficient

This coefficient is determined the gain point of the analogue signal level. Enter the new value via <  > and <  > keys and press <  > key to go to the next step.

7 MODBUS RTU

FT-10 MB indicator has a Modbus RTU interface over RS 485 / RS 232C serial port. This interface can be as High-Low or Low-High for different type of PLC's.

7.1 Modbus RTU Data Structure

After programming RS 485 / RS 232C serial port for Modbus RTU, it can be used as Modbus RTU slave on Modbus RTU network. The Modbus slave address is defined in the RS-485 address (*Page 33*). Functions code '0x03' (Read Holding Registers) and '0x06' (Single Write Registers), '0x10' (Preset Multiple Registers) and '0x17' (Read/Write Multiple Registers) are supported.

Modbus RTU High-Low: In two-word registers, the data is stored to the registers in big-endian format. Least significant word is stored to the highest register address; and most significant word is stored to the lowest register address.
Modbus RTU Low-High: In two-word registers, the data is stored to the registers in little-endian format. Least significant word is stored to the lowest register address; and most significant word is stored to the highest register address.

[00-] RS 232C Serial Port

This sub-block includes the parameters about the 1st serial interface of FT-10.

[000 3] Data Format
4 : Modbus RTU High-Low
5 : Modbus RTU Low-High

Set the RS 485 / RS 232C Data Format : Modbus RTU High-Low or Modbus RTU Low-High
RS-485 Data Length & Parity : 8 none 1, 8 odd 1 or 8 even 1,
RS-485 Address : 01 to 31
Make the RS-485 / RS 232C parameter settings as defined on Page 32.
Please find Modbus information in the web site of http://www.modbus.org

Modbus RTU Command Table

Address	R/W	Word	Command		Definition	
40001	R	2	Indicated weight		(Net if the indication is in Net, Peak value or Hold value)	
40003	R	1	Status	D0	0 – System Ready	1 – System Busy
				D1	0 – Error (D13-D15)	1 – Data ok
				D2	0 – Weight Stable	1 – Weight unstable
				D3	0 – Gross Mode	1 – Net mode
				D4 – D11	Not used	
				D12	0 – Out of zero range	1 – Weight is in zero range
				D13 D14 D15	Error Code	Dec / Description 0 No Errors 1 ADC out of range 2 ADC over range 3 ADC under range 4 System error 5 In programming mode 6 Low/High voltage det.
40004	R	2	Tare weight			
40006	R	2	Gross weight			
40008	R	1	Status		Motion, Net mode, Data ok, (image of register 40003)	
40009	R/W	1	Control	Dec	Description	
				0	None	
				1	Zero	
				2	Tare	
				3	Clear	
				4	Print	
				5	Not used	

<table>
<tr><td></td><td></td><td></td><td></td><td>6</td><td colspan="3">Print the Total value</td></tr>
<tr><td></td><td></td><td></td><td></td><td>7</td><td colspan="3">Clear the Total value</td></tr>
<tr><td>40010</td><td>R/W</td><td>20</td><td colspan="5">Not used</td></tr>
<tr><td rowspan="8">40030</td><td rowspan="8">R/W</td><td rowspan="8">1</td><td rowspan="8">Calibration</td><td>Dec</td><td colspan="2">Description</td></tr>
<tr><td>0</td><td colspan="2">None</td></tr>
<tr><td>188</td><td colspan="2">Adjust Zero Calibration</td></tr>
<tr><td>220</td><td colspan="2">Adjust Span Calibration (1)</td></tr>
<tr><td>236</td><td>Total Load Cell Capacity (1)</td><td rowspan="4">eCal
Coefficients</td></tr>
<tr><td>250</td><td>Average mV/V (1)</td></tr>
<tr><td>171</td><td>Dead Load (1)</td></tr>
<tr><td>23205</td><td>Save the coefficients of eCal</td></tr>
<tr><td>40031</td><td>R/W</td><td>2</td><td colspan="5">Span Calibration Value / LC capacity / mV value / Dead load value</td></tr>
<tr><td rowspan="11">40033</td><td rowspan="11">R</td><td rowspan="11">1</td><td rowspan="11">Calibration
Status</td><td rowspan="4">D0 .. D7

Calibration
Process
Status</td><td>Dec</td><td colspan="2">Description</td></tr>
<tr><td>1</td><td colspan="2">Ready for calibration</td></tr>
<tr><td>3</td><td colspan="2">Zero calibration in process …</td></tr>
<tr><td>4</td><td colspan="2">Span calibration in process …</td></tr>
<tr><td rowspan="7">D8 .. D15

Calibration
Errors</td><td>9</td><td colspan="2">Error (Refer to D8 ... D15)</td></tr>
<tr><td>1</td><td colspan="2">Calibration Timeout
- Restart calibration</td></tr>
<tr><td>2</td><td colspan="2">ADC Error
- Re-energize the instrument
- If seen again, change the board.</td></tr>
<tr><td>3</td><td colspan="2">Instrument cannot be calibrating
- Check load cell cable
- Re-energize the instrument</td></tr>
<tr><td>34</td><td colspan="2">Instrument cannot be calibrating
- Load cell signal is very low or too high</td></tr>
<tr><td>35</td><td colspan="2">Calibration Error
- Calibration loading is not enough
- Check test weight loading
- Check load cell connections</td></tr>
<tr><td>36</td><td colspan="2">Calibration load value entry Error
- Test weight is too small. Increase the test weight</td></tr>
<tr><td>37</td><td colspan="2">Scale unstable
- Wait until scale become stable
- Check grounding wiring</td></tr>
<tr><td>38</td><td colspan="2">The Calibration DIP switch is not ON position.
- Check the calibration DIP switch.</td></tr>
<tr><td>40034</td><td>R/W</td><td>37</td><td colspan="5">Not used</td></tr>
<tr><td>40071</td><td>R</td><td>1</td><td colspan="2">Indicated weight</td><td colspan="3">Net if the indication is in Net, Peak value or Hold value)</td></tr>
<tr><td>40072</td><td>R</td><td>1</td><td colspan="2">Status</td><td colspan="3">Motion, Net mode, Data ok, (image of register 40003)</td></tr>
<tr><td>40073</td><td>R</td><td>1</td><td colspan="5">Tare weight</td></tr>
<tr><td>40074</td><td>R</td><td>1</td><td colspan="5">Gross weight</td></tr>
<tr><td colspan="8"></td></tr>
<tr><td>40100</td><td>R</td><td>1</td><td colspan="2">Voltage of
Power Supply</td><td colspan="3">Voltage of power supply is indicated with 0.1 V increment.
For example: 23.4 VDC is indicated as integer 234 value.</td></tr>
<tr><td colspan="8"></td></tr>
<tr><td>40196</td><td>R/W</td><td>2</td><td colspan="2">Digital I/O port-1</td><td colspan="3">Refer to parameter [138] on page 38</td></tr>
<tr><td>40198</td><td>R/W</td><td>2</td><td colspan="2">Digital I/O port-2</td><td colspan="3">Refer to parameter [139] on page 38</td></tr>
<tr><td rowspan="4">40200</td><td rowspan="4">R</td><td rowspan="4">1</td><td rowspan="4" colspan="2">Status of Inputs</td><td>D0</td><td>Input-1</td><td rowspan="4">0 - Passive 1 - Active</td></tr>
<tr><td>D1</td><td>Input-2</td></tr>
<tr><td>D2</td><td>Input-3</td></tr>
<tr><td>D3</td><td>Input-4</td></tr>
<tr><td rowspan="2">40201</td><td rowspan="2">R/W</td><td rowspan="2">1</td><td rowspan="2" colspan="2">Status of Outputs</td><td>D0</td><td>Output-1</td><td rowspan="2">0 - Passive 1 - Active</td></tr>
<tr><td>D1</td><td>Output-2</td></tr>
</table>

				D2	Output-3	
				D3	Output-4	
				D4	Output-5	
				D5	Not used	
				D6	Error	
				D7	Zero range	
40202	R/W	2	Setpoint 1 Low (2)			
40204	R/W	2	Setpoint 1 High			
40206	R/W	2	Setpoint 2 Low (2)			
40208	R/W	2	Setpoint 2 High			
40210	R/W	2	Setpoint 3 Low (2)			
40212	R/W	2	Setpoint 3 High			
40214	R/W	2	Setpoint 4 Low (2)			
40216	R/W	2	Setpoint 4 High			
40218	R/W	2	Setpoint 5 Low (2)			
40220	R/W	2	Setpoint 5 High			
42000	R/W	1	Filter	Refer to parameter [120] on page 37		
42001	R/W	1	Power On Zero	Refer to parameter [202] on page 39		
42002	R/W	1	Zeroing Range	Refer to parameter [203] on page 39		
42003	R/W	1	Auto Zero Tracking	Refer to parameter [204] on page 39		
42004	R/W	1	Tare	Refer to parameter [205] on page 39		
42005	R/W	1	Motion Detector	Refer to parameter [206] on page 39		
42006	R/W	1	Stability Period	Refer to parameter [207] on page 39		
42007	R/W	1	Operation mode	Refer to parameter [210] on page 40		
42008	R/W	2	Capacity	Refer to parameter [212] on page 40		
42010	R/W	1	Decimal point	Dec	Description	
				0	XXXXOO	
				1	XXXXXO	
				2	XXXXXX	
				3	XXXXX.X	
				4	XXXX.XX	
				5	XXX.XXX	
42011	R/W	1	Increment	Dec	Description	
				1	X 1	
				2	X 2	
				3	X 5	

(1) Write this command after writing values to 40031-32 addresses.

(2) Only set point low addresses are used if the set point is programmed as standard.

Programming steps of frequent used ……
Reading a weight value:

1. Read 40003,
2. Check D0=0 and D1=1,
3. If yes, read a weight value (gross, net or tare),
4. If D0=1, check D0 until system ready,
5. If D1=0, check the error code.

Zero Calibration procedure:

1. Check the low byte of 40033. it should be decimal '1' to start adjustment.
2. Load the decimal '188' to 40030 to start Zero calibration.
3. Check the low byte of 40033. it is decimal '3' during zero calibration process.
4. The low byte of 40033 changes to decimal '1' at the end of the Zero calibration.
5. If the low byte of 40033 is '9', check the high byte of 40033 to understand the calibration error.

Span Calibration procedure:

1. Check the low byte of 40033. it should be decimal '1' to start adjustment.
2. First load the span value to 40031-32 and then load the decimal '220' to 40030 to start Span calibration.
3. Check the low byte of 40033. it is decimal '4' during span calibration process.
4. The low byte of 40033 changes to decimal '1' at the end of the Span calibration.
5. If the low byte of 40033 is '9', check the high byte of 40033 to understand the calibration error.

EXPLANATION:
Attention: *For hardware connection details, please refer to the related hardware descriptions in this manual.*

Exception codes:

1: Function code is not supported.
2: Out of beginning and ending address range.
3: Invalid value entrance or wrong byte number.
4: Operation error.

Command Examples:
Performing Read and Write operations according (Modbus RTU High-Low) to hex system with the instrument set to address "0x01".

Below you will find some command samples;

Description	**Hex**
Request weight data	01,03,00,00,00,02,C4,0B
Answer of request weight (weight value is 100000)	01,03,04,00,01,86,A0,38,4A
Request status data	01,03,00,02,00,01,25,CA
Taring	01,10,00,08,00,01,02,00,02,26,D9
Request tare data	01,03,00,03,00,02,34,0B
Answer of request tare (tare value is 10000)	01,03,04,00,00,27,10,E0,0F
Zero Command	01,10,00,08,00,01,02,00,01,66,D8
Request Calibration Status	01,03,00,20,00,01,85,C0
Answer of request Calibration Status (Instrument is ready for calibration)	01,03,02,00,01,79,84
Zero Calibration	01,10,00,1D,00,01,02,00,BC,A4,6C
Span Calibration Command with Span value 50000	01,10,00,1D,00,03,06,00,DC,00,00,C3,50,F7,F0
Total LC capacity Command with Total LC capacity value 100000	01,10,00,1D,00,03,06,00,EC,00,01,86,A0,D4,E0
Average mV/V Command with Average mV/V value 1.9999	01,10,00,1D,00,03,06,00,FA,00,00,4E,1F,DA,93
Dead load Command with Dead load value 12345	01,10,00,1D,00,03,06,00,AB,00,00,30,39,87,25
Save the coefficients of eCal Command	01,10,00,1D,00,01,02,5A,A5,5F,06
Read Voltage of Power Supply value	01,03,00,63,00,01,74,14
Answer of Voltage of Power Supply (Voltage of Power Supply is 23,5 V)	01,03,02,00,EB,F8,0B
Read digital inputs	01,03,00,C7,00,01,35,F7
Answer of digital inputs (Input-2 is active)	01,03,02,00,02,39,85
Read digital outputs	01,03,00,C8,00,01,05,F4
Answer of digital outputs (Output-3 is Active)	01,03,02,00,04,B9,87

Read Setpoint-1 Low	01,03,00,C9,00,02,14,35
Answer of Setpoint-1 Low	01,03,04,00,00,03,E8,FA,8D
Load Set point 1 Low = 5000	01,10,00,C9,00,02,04,00,00,13,88,32,C3

8 PROFIBUS (ONLY FT-10 PB)

In Profibus DPV1 interface, baud rate is detected automatically. Supported baud rates are 9.6 kbps, 19.2 kbps, 45.45 kbps, 93.75 kbps, 187.5 kbps, 500 kbps, 1.5 Mbps, 3 Mbps, 6 Mbps and 12 Mbps. No 'baud rate' instance exists.
After programming Profibus related parameters of the FT-10 PB indicator, you can communicate with the instrument.
GSD file is available on www.flintec.com

[05-] Profibus

This sub-block includes the parameters related with the Profibus interfaces of FT-10 indicator.

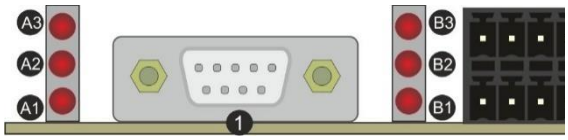
[050 0] Data Format

0 : Signed 32 bit integer, no decimal point implied
1 : 32 bit float, decimal point implied

[051 000] Rack Address

The Profibus rack address of FT-10 will be entered via keypad between 1 to 126.

There are LEDs near the Profibus connector which are;



A3	Operation Error	B3	Module Error
A2	Not used	B2	Not used
A1	Operation mode	B1	Module status

A1 Operation Mode LED

State	Indication	Comment
Off	Not online/ No power	Check power cable
On	Online, data exchange	---
Flashing	Online, clear	---

A3 Operation Error

State	Indication	Comment
Off	No error	
Flashing (2 flash)	PROFIBUS configuration error	Check GSD file configuration.

B1 Module Status LED

State	Indication	Comment
Off	No power or not initialized	No power or Profibus module is in initialization state
On	Initialized	
Flashing	Initialized, diagnostic event(s) present	Diagnostic is active

B3 Module Error LED

State	**Indication**	**Comment**
Off	No error	
On	Exception error	There is an exception error

8.1 Data Format

Data format of weight value can be programmable for Floating point (IEEE 754) or Integer. Refer to parameter [050].

8.2 GSD / GSDML Configuration

Profibus / Profinet data consists of 2 x Input 2 words and 2 x Output 2 words. GSD / GSMDL configuration for PLC programmers is shown in Figure 8.1.

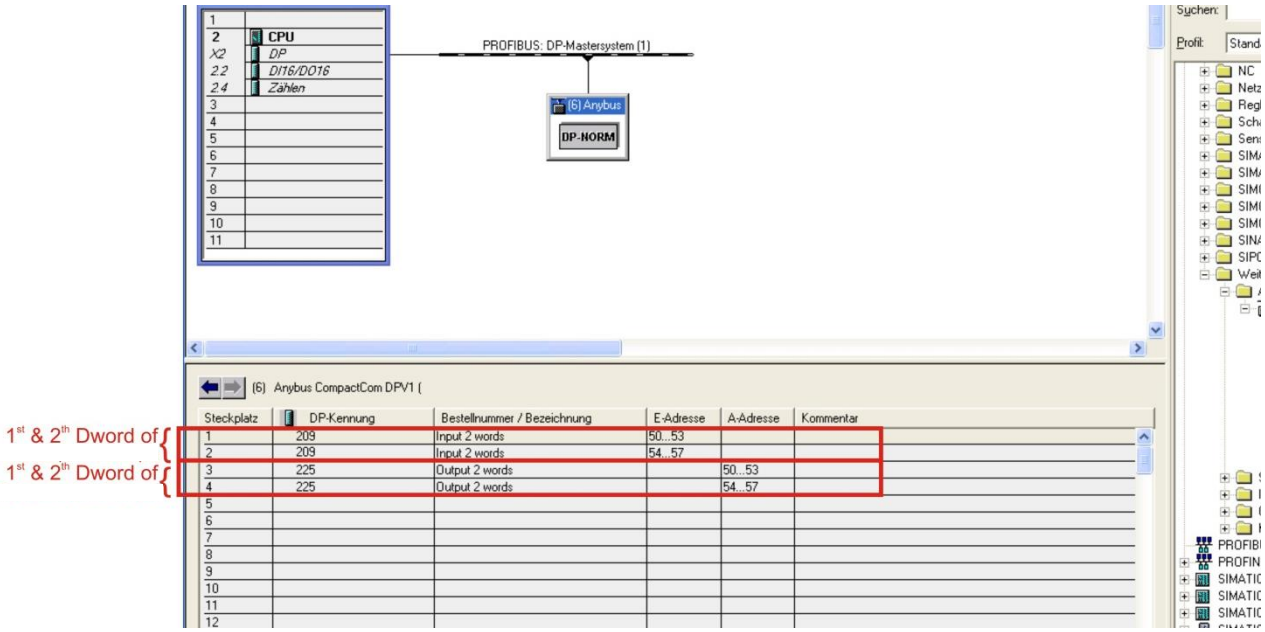


Figure 8.1 – GSD / GSMDL Configuration

GSD /GSDML Configuration	Description
Input 2 words	1st Dword (FT-10 Px Output to PLC Input)
Input 2 words	2nd Dword (FT-10 Px Output to PLC Input)
Output 2 words	1st Dword (PLC Output to FT-10 Px Input)
Output 2 words	2nd Dword (PLC Output to FT-10 Px Input)

8.3 Profibus DP / Profinet Data Structure

FT-10 Px Output to PLC Input

Bitwise of a Dword:

Dword (Only read)	D31	D30	D29	D28	D27	D26	D25	D24	D23	D22	D21	D20	D19	D18	D17	D16
	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0

1st Dword	By default, Indicated weight value is represented. To represent other weight or calibration status, refer to next Dword.															
2nd Dword	Zero-range	Error output		Out 5	Out 4	Out 3	Out 2	Out 1					In 4	In 3	In 2	In 1
	Error codes of FT-10 Px				Not in use			Centre of zero	Gross Net	MD	Read command response					Cmd Flag

FT-10 Px Output to PLC Input 2nd Dword

Bit Number	2nd Dword Description			
D31	Zero range output status (ref. Parameter [116]			(Active = 1)
D30	Error output status			(Active = 1)
D29 … D24	Outputs	Output bit status (Active = 1)		
D23 … D16	Inputs	Input bit status (Active = 1)		
D15 … D12	Error Codes of FT-10 Px	Bin	Dec	
		0000	0	No error found
		0001	1	ADC out
		0010	2	ADC over
		0011	3	ADC under
		0100	4	System Error
		0101	5	In programming mode
		0110	6	Low/High Voltage Error
D11 … D9	Not in use			
D8	Centre of Zero	0		Weight is in out of zero range
		1		Weight is in zero range
D7	Indication	0		Gross
		1		Net
D6	MD – Motion Detection	0		Stable
		1		Dynamic
D5 … D1	Read Command Response	00000	0	Indicated weight
		00001	1	Gross weight
		00010	2	Tare weight
		00011	3	Calibration Status
		00100 01110	4 14	Not used
		01111	15	Set Point-1 Low
		10000	16	Set Point-1 High
		10001	17	Set Point-2 Low
		10010	18	Set Point-2 High
		10011	19	Set Point-3 Low
		10100	20	Set Point-3 High
		10101	21	Set Point-4 Low
		10110	22	Set Point-4 High
		10111	23	Set Point-5 Low
		11000	24	Set Point-5 High
		11111	31	Use the Expanded Command list (Refer to Table 8.2)
D0	CMD Flag	Toggles		The command is applied successfully

Calibration Status (always 32 bit integer)

1st Dword descriptions when read command is 'Calibration Status'. Refer to 2nd Dword of PLC Output to FT-10 Px Input

Bit Number	1st Dword Description			
D31 … D16	Not in use			
D15 … D8	Calibration Errors	Bin	Dec	Descriptions
		0000 0001	1	Calibration Timeout - Restart calibration
		0000 0010	2	ADC Error - Re-energize the instrument
		0000 0011	3	Instrument cannot be calibrating - Check load cell cable - Re-energize the instrument
		0010 0010	34	Instrument can not be calibrating - Load cell signal is very low or too high
		0010 0011	35	Calibration Error - Calibration loading is not enough - Check test weight loading (Write test weight value to 1st Dword of PLC Output to FT-10 Px Input then restart the calibration) - Check load cell connections
		0010 0100	36	Calibration load value entry Error - Test weight is too small. Increase the test weight
		0010 0101	37	Scale unstable - Wait until scale become stable - Check grounding wiring
		0010 0110	38	The Calibration DIP switch is not ON position. - Check the calibration DIP switch.
D7 ... D0	Calibration Process Status	0000 0001	1	System ready for calibration
		0000 0011	3	Zero calibration in process
		0000 0100	4	Span calibration in process
		0000 1001	9	Error (Refer to Calibration Errors)

Table 9.1 – Calibration Status

PLC Output to FT-10 Px Input

Bitwise of a Dword:

Dword (R/W)	D31	D30	D29	D28	D27	D26	D25	D24	D23	D22	D21	D20	D19	D18	D17	D16
	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0

1st Dword	Next Dword defines the usage of this Dword.										
2nd Dword				Out 5	Out 4	Out 3	Out 2	Out 1	Expanded Commands List		
	Not in use					Command List			Read Data Selection		New CMD

PLC Output to FT-10 Px Input 2nd Dword

Bit Number	2rd Dword descriptions				
D31 … D24	Set / Reset digital outputs				
D23 … D16	Expanded Commands List (Refer to Table 8.2)				
D15 ... D11	Not in use				
D10 … D6	Command List	Bin	Dec	Commands	
		00000	0	None command is activated	
		00001	1	Zero	
		00010	2	Tare	
		00011	3	Clear	
		00100	4	Print	
		00101	5	Adjust zero calibration	Calibration
		00110	6	Adjust span calibration (1)	
		00111	7	Total Load Cell Capacity (1)	eCal Coefficients Refer to par. [313]
		01000	8	Average mV/V value (1)	
		01001	9	Dead Load value (1)	
		01010	10	Save the coefficients of eCal	
		01011 … 01110	11 … 14	Not used	
		01111	15	Set Point-1 Low (1)	
		10000	16	Set Point-1 High (1)	
		10001	17	Set Point-2 Low (1)	
		10010	18	Set Point-2 High (1)	
		10011	19	Set Point-3 Low (1)	
		10100	20	Set Point-3 High (1)	
		10101	21	Set Point-4 Low (1)	
		10110	22	Set Point-4 High (1)	
		10111	23	Set Point-5 Low (1)	
		11000	24	Set Point-5 High (1)	
		11111	31	Use the Expanded Command list (Refer to Table 8.2)	
D5 ... D1	Read Data Selection	00000	0	Indicated weight	
		00001	1	Gross weight	
		00010	2	Tare weight	
		00011	3	Calibration Status (Refer to Table 8.)	
		00100 … 01110	4 … 14	Not used	
		01111	15	Set Point-1 Low (2)	
		10000	16	Set Point-1 High	
		10001	17	Set Point-2 Low (2)	

		10010	18	Set Point-2 High
		10011	19	Set Point-3 Low (2)
		10100	20	Set Point-3 High
		10101	21	Set Point-4 Low (2)
		10110	22	Set Point-4 High
		10111	23	Set Point-5 Low (2)
		11000	24	Set Point-5 High
		11111	31	Use the Expanded Command list (Refer to Table 8.2)
D0	New CMD	Toggle		Apply commands which are listed in this table

(1) Write this command after writing values to 1st Dword , then apply this command with New CMD
(2) Only set point low addresses are used if the set point is programmed as standard.

Expanded Command List (always 32 bit integer)
The "D23 … D16" bits in 2nd Dword describes below.

Bit No	**Description**						
D23…D16	Expanded Commands List	Bin	Dec	Commands			
		00000000	0	R	Voltage of Power Supply	Indicated with 0.1 VDC increment.	
		00000001 00111111	1 63	Not in use			
		01000000	64	RW	Filter (1)	Refer to par. [120], page 37	
		01000001	65	RW	Power On Zero (1)	Refer to par. [202], page 39	
		01000010	66	RW	Zeroing Range (1)	Refer to par. [203], page 39	
		01000011	67	RW	Auto Zero Tracking (1)	Refer to par. [204], page 39	
		01000100	68	RW	Tare (1)	Refer to par. [205], page 39	
		01000101	69	RW	Motion Detector (1)	Refer to par. [206], page 39	
		01000110	70	RW	Stability Period (1)	Refer to par. [207], page 39	
		01000111	71	RW	Operation mode (1)	Refer to par. [210], page 40	
		01001000	72	RW	Capacity (1)	Refer to par. [212], page 40	
		01001001	73	RW	Decimal point (1)	0	XXXXOO
						1	XXXXXO
						2	XXXXXX
						3	XXXXX.X
						4	XXXX.XX
						5	XXX.XXX
		01001010	74	RW	Increment (1)	1	X1
						2	X2
						3	X5

Table 8.2 - Expanded Command List

(1) Write this command after writing values to 1st Dword then apply this command with New CMD

Programming steps of frequent used ……
Reading a weight value:

1. Check the D12…D15 bits of 'FT-10 Px Output to PLC Input 2nd Dword'.
2. If there is not any error, read a weight value (gross, net or tare),

Zero Calibration procedure:

1. Check the low byte of Calibration Status. it should be decimal '1' to start adjustment.
2. Write 'Adjust Zero Calibration' command and apply New CMD to start Zero calibration.
3. Check the low byte of Calibration Status. it is decimal '3' during zero calibration process.
4. The low byte of Calibration Status changes to decimal '1' at the end of the Zero calibration.
5. If the low byte of Calibration Status is '9', check the high byte of Calibration Status to understand the calibration error.

Span Calibration procedure:

1. Check the low byte of Calibration Status. it should be decimal '1' to start adjustment.
2. Write 'Adjust Span Calibration' command after writing test weight values to 1st Dword, then apply this command with New CMD to start Span calibration.
3. Check the low byte of Calibration Status. it is decimal '4' during span calibration process.
4. The low byte of Calibration Status changes to decimal '1' at the end of the Span calibration.
5. If the low byte of Calibration Status is '9', check the high byte of Calibration Status to understand the calibration error.

9 PROFINET (ONLY FT-10 PN)

The Profinet interface operates at 100Mbit, full duplex, as required by Profinet.
GSDML file is available on Internet www.flintec.com.

Attention: There are two different GSDML files depending on Profinet version.

Profinet interface of the weighing instrument can be done via hub switch or serial bus over two Profinet ports.

1. Serial bus connection. You may connect instruments serial to your Profinet bus via two ports.
2. Star connection. If you connect the instrument to your PLC via hub switch, you can use P1 or P2 port on the instrument. You may change the port if there is any malfunction on port in usage.

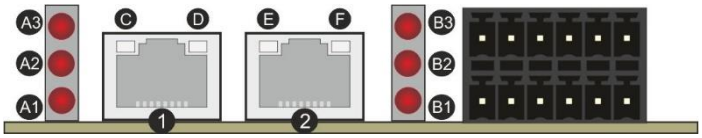
[06-] Profinet

This sub-block includes the parameters related with the Profinet interfaces of FT-10 indicator.

[060 0] Data Format

0 : Signed 32 bit integer, no decimal point implied
1 : 32 bit float, decimal point implied

There are announcement LEDs on rear to indicate the interface status as seen below. The meanings of these LED's are;



A3	Not used	B3	Module Error	1,2	Interface ports
A2	Not used	B2	Not used	D, F	Not used
A1	Network Status	B1	Module Status	C, E	Link / Activity

A1 Network Status LED

LED State	Description	Comment
Off	Not online /No power	Check power and cable
On	On-line RUN	-
Flashing	On-line STOP	-

B1 Module Status LED

LED State	Description	Comment
Off	Not power or not initialized	No power or Profinet module is in initialization state
On	Normal operation	
1 flash	Initialized, diagnostic event(s) present	Diagnostic is active

B3 Module Error LED

LED State	Description	Comment
Off	No Error	
On	Exception error	There is an exception error
1 flash	Configuration Error	Check GSDML configuration
2 flashes	IP Address Error	IP address not set
3 flashes	Device Name Error	Device name not set
4 flashes	Internal Module Error	Re-energize the instrument. If seen again, change the board.

In the case of LED warning, check cabling, configuration, IP address and device name before reenergizing the instrument after 30 seconds of power off.

C,E LINK / Activity LED

LED State	Description	Comment
Off	No Link	No link, no communication present
On	Link	Ethernet link established, no communication present
Flickering	Activity	Ethernet link established, communication present

9.1 Data Format

Data format of weight value can be programmable for Floating point (IEEE 754) or Integer. Refer to parameter [060].

9.2 Profinet Parameters

There are 7 parameters for Profinet network and Profinet set up is done by by IndFace1x (Indface1x PC) software over Local Network Area as described in this section. Indface1x PC software is available on www.flintec.com

Note: *Station name is 'pn-io' as a default.*

DHCP
Dynamic Host Configuration Protocol automates network parameters if it is enabled.
Default is 'Disable'.

IP Address
If DHCP is disabled, obtain IP address manually.
Default is '192.168.16.250'.

Subnet Mask
If DHCP is disabled, obtain subnet mask manually.
Default is '255.255.255.0'.

Default Gateway
If DHCP is disabled, obtain default gateway manually.
Default is '192.168.16.253'.

Primary DNS
If DHCP is disabled, obtain primary DNS manually.
Default is '208.67.222.222'.

Secondary DNS
If DHCP is disabled, obtain secondary DNS manually.
Default is '208.67.220.220'.

Host Name
Enter a unique host name to the instrument.
Default is ' '.

9.3 GSDML Configuration and Data Structure

Profinet data structures of FT-10 PN includes 2 x Input 2 words and 2 x Output 2 words.
Please see the Profibus Data Structure that is the same like for Profinet. Refer to page 64.
GSDML configuration for PLC programmers, same as for Profibus, is shown on Page 64

10 ETHERNET TCP/IP (ONLY FT-10 EN)

Ethernet output of FT-10 EN is programmable to BSI command set, Continuous data output, Fast continuous data output, Modbus TCP/IP High-Low, Modbus TCP/IP Low-High.
The first three data structures can be find in the related sections indicated in the table below.
You can find below the difference of Low-High and High-Low data formats and some companies using these formats.

Data Format	Description	Company samples
BSI Command set	Refer to *Page 48*	
Continuous	Refer to *Page 48*	-
Fast Continuous	Refer to *Page 47*	-
Modbus TCP High-Low	Modbus TCP interfacing. Refer to *Page 72*.	Interfacing with PLC.
Modbus TCP Low-High	Modbus TCP interfacing. Refer to *Page 72*.	Interfacing with PLC.

Table 10.1 - Ethernet output interfacing

[03-] Ethernet

[030 4] Data Format

0 : No data transfer.
1 : Continuous data output (*Page 47*)
2 : Print mode (*Parameter [040]* *(Page 35*)
3 : BSI command set (*Page 48*)
4 : Modbus TCP High-Low *(Page 72*)
5 : Modbus TCP Low-High (*Page 72*)
6 : Fast continuous mode (*Page 47*)

[031 01] Device Address

The address of FT-10 will be entered between 01 to 255.

[032] IP Address

The IP address will be entered as ” aaa.bbb.ccc.ddd ”. **Default**: “192.168.16.250”.

For changing the IP address, press the <  > key and enter the first 3 “a” digits of the IP address. Press <  > key to access the following “b”, “c” and “d” address entries.

Press the <  > key to access the next parameter.

[033] Subnet Mask Address

The IP address will be entered as ” aaa.bbb.ccc.ddd ”. **Default**: “255.255.255.000”.

For changing the IP address, press the <  > key and enter the first 3 “a” digits of the IP address. Press <  > key to access the following “b”, “c” and “d” address entries.

Press the <  > key to access the next parameter.

[034] Gateway Address

The IP address will be entered as ” aaa.bbb.ccc.ddd ”. **Default**: “192.168.16.253”.

For changing the IP address, press the <  > key and enter the first 3 “a” digits of the IP address. Press <  > key to access the following “b”, “c” and “d” address entries.

Press the <  > key to access the next parameter.

[035] Local Port

The local port will be entered between 00001 to 65535. **Default:** “502”.

[036 0] Response Speed

0 : Modbus TCP Answer is sent immediately after Request is received.
1 : Modbus TCP Answer is delayed 20 msec after Request is received.
2 : Modbus TCP Answer is delayed 50 msec after Request is received.
This property is very helpful for slow PLC systems

10.1 Ethernet Parameters

There are 11 parameters for Ethernet network and Ethernet set up done by Indface1x PC software over Local Network Area as described in this section or You can entry from par. [**03-**] blocks. Indface1x PC software is available in CD which is supplied together with the instrument.

Host Name
Device name of the instrument.
Default is ‘ ’.

IP Address
Obtain IP address manually.
Default is ‘192.168.16.250’.

Local Port
Ethernet connection port of the instrument.
Default is ‘502’.

Gateway
Network point that acts as an entrance to another network.
Default is ‘192.168.16.253’.

Subnet Mask
Describes IP address can be used in network.
Default is ‘255.255.255.0’.

Primary DNS
Obtain primary DNS manually.
Default is ‘208.67.222.222’.

Secondary DNS
Obtain secondary DNS manually.
Default is ‘208.67.220.220’.

Remote Connection
Automatic connection to any device on the network.
Default is ‘Disabled’.
Remote IP: IP address of the PC or Device to be connected automatically.
Remote Port: Ethernet connection point of PC or Device to be connected automatically.

Passwort Ethernet: Factory default: 123456
Set defaults: Set factory default**.**

10.2 Modbus TCP Data Structure

If the instrument is programmed for Modbus TCP/IP, it can be used as a Modbus TCP/IP slave on Ethernet communication network. Functions code '0x03' (Read Holding Registers) and '0x06' (Single Write Registers), '0x10' (Preset Multiple Registers) and '0x17' (Read/Write Multiple Registers) are supported.

Modbus TCP/IP High-Low: In two-word registers, the data is stored to the registers in big-endian format. Least significant word is stored to the highest register address; and most significant word is stored to the lowest register address.
Modbus TCP/IP Low-High: In two-word registers, the data is stored to the registers in little-endian format. Least significant word is stored to the lowest register address; and most significant word is stored to the highest register address.

Parameter set-up:
Set Ethernet Data Format : Modbus TCP/IP High-Low or Modbus TCP/IP Low-High
Ethernet Address : 01 to 255

Make the Ethernet parameter settings.
Please find Modbus information in the web site of http://www.modbus.org

Modbus TCP/IP Command Table;

Address	R/W	Word	Command		Definition	
40001	R	2	Indicated weight		(Net if the indication is in Net)	
40003	R	1	Status	D0	0 – System Ready	1 – System Busy
				D1	0 – Error (D13-D15)	1 – Data ok
				D2	0 – Weight Stable	1 – Weight unstable
				D3	0 – Gross Mode	1 – Net mode
				D4 – D11	Not used	
				D12	0 – Out of zero range	1 – Weight is in zero range
				D13 D14 D15	Error Code	Dec: Description 0: No Errors 1: ADC out of range 2: ADC over range 3: ADC under range 4: System error 5: In programming mode 6: Low/High voltage det.
40004	R	2	Tare weight			
40006	R	2	Gross weight			
40008	R	1	Status		Motion, Net mode, Data ok, (image of register 40003)	

40009	R/W	1	Control	Dec	Description	
				0	None	
				1	Zero	
				2	Tare	
				3	Clear	
				4	Print	
				5	Not used	
				6	Print the Total value	
				7	Clear the Total value	
40010	R/W	20	Not used			
40030	R/W	1	Calibration	Dec	Description	
				0	None	
				188	Adjust Zero Calibration	
				220	Adjust Span Calibration (1)	
				236	Total Load Cell Capacity (1)	eCal Coefficients
				250	Average mV/V (1)	
				171	Dead Load (1)	
				23205	Save the coefficients of eCal	
40031	R/W	2	Span Calibration Value / LC capacity / mV value / Dead load value			
40033	R	1	Calibration Status	D0 .. D7	Dec: Description 1: Ready for calibration	

				Calibration Process Status	3	Zero calibration in process …
					4	Span calibration in process …
					9	Error (Refer to D8 ... D15)
				D8 .. D15 Calibration Errors	1	Calibration Timeout - Restart calibration
					2	ADC Error - Re-energize the instrument - If seen again, change the board.
					3	Instrument can not be calibrating - Check load cell cable - Re-energize the instrument
					34	Instrument can not be calibrating - Load cell signal is very low or too high
					35	Calibration Error - Calibration loading is not enough - Check test weight loading - Check load cell connections
					36	Calibration load value entry Error - Test weight is too small. Increase the test weight
					37	Scale unstable - Wait until scale become stable - Check grounding wiring
					38	The Calibration DIP switch is not ON position. - Check the calibration DIP switch.

40034	R/W	37	Not used			
40071	R	1	Indicated weight	Net if the indication is in Net, Peak value or Hold value)		
40072	R	1	Status	Motion, Net mode, Data ok, (image of register 40003)		
40073	R	1	Tare weight			
40074	R	1	Gross weight			
40100	R	1	Voltage of Power Supply	Voltage of power supply is indicated with 0.1 V increment. Example: 23.4 VDC is indicated as integer 234 value.		
40196	R/W	2	Digital I/O port-1	Refer to parameter [138] on page 38		
40198	R/W	2	Digital I/O port-2	Refer to parameter [139] on page 38		
40200	R	1	Status of Inputs	D0	Input-1	0 - Passive 1 - Active
				D1	Input-2	
				D2	Input-3	
				D3	Input-4	
40201	R/W	1	Status of Outputs	D0	Output-1	0 - Passive 1 - Active
				D1	Output-2	
				D2	Output-3	
				D3	Output-4	
				D4	Output-5	
				D5	Not used	
				D6	Error	
				D7	Zero range	
40202	R/W	2	Setpoint 1 Low (2)			
40204	R/W	2	Setpoint 1 High			
40206	R/W	2	Setpoint 2 Low (2)			
40208	R/W	2	Setpoint 2 High			
40210	R/W	2	Setpoint 3 Low (2)			
40212	R/W	2	Setpoint 3 High			
40214	R/W	2	Setpoint 4 Low (2)			
40216	R/W	2	Setpoint 4 High			
40218	R/W	2	Setpoint 5 Low (2)			
40220	R/W	2	Setpoint 5 High			

42000	R/W	1	Filter	Refer to parameter [120] on page 37	
42001	R/W	1	Power On Zero	Refer to parameter [202] on page 39	
42002	R/W	1	Zeroing Range	Refer to parameter [203] on page 39	
42003	R/W	1	Auto Zero Tracking	Refer to parameter [204] on page 39	
42004	R/W	1	Tare	Refer to parameter [205] on page 39	
42005	R/W	1	Motion Detector	Refer to parameter [206] on page 39	
42006	R/W	1	Stability Period	Refer to parameter [207] on page 39	
42007	R/W	1	Operation mode	Refer to parameter [210] on page 40	
42008	R/W	2	Capacity	Refer to parameter [212] on page 40	
42010	R/W	1	Decimal point	Dec	Description
				0	XXXXOO
				1	XXXXXO
				2	XXXXXX
				3	XXXXX.X
				4	XXXX.XX
				5	XXX.XXX
42011	R/W	1	Increment	Dec	Description
				1	X 1
				2	X 2
				3	X 5

(1) Write this command after writing values to 40031-32 addresses.
(2) Only set point low addresses are used if the set point is programmed as standard.

Programming steps of frequent used ……
Reading a weight value:

1. Read 40003,
2. Check D0=0 and D1=1,
3. If yes, read a weight value gross, net or tare),
4. If D0=1, check D0 until system ready,
5. If D1=0, check the error code.

Zero Calibration procedure:

1. Check the low byte of 40033. it should be decimal '1' to start adjustment.
2. Load the decimal '188' to 40030 to start Zero calibration.
3. Check the low byte of 40033. it is decimal '3' during zero calibration process.
4. The low byte of 40033 changes to decimal '1' at the end of the Zero calibration.
5. If the low byte of 40033 is '9', check the high byte of 40033 to understand the calibration error.

Span Calibration procedure:

1. Check the low byte of 40033. it should be decimal '1' to start adjustment.
2. First load the span value to 40031-32 and then load the decimal '220' to 40030 to start Span calibration.
3. Check the low byte of 40033. it is decimal '4' during span calibration process.
4. The low byte of 40033 changes to decimal '1' at the end of the Span calibration.
5. If the low byte of 40033 is '9', check the high byte of 40033 to understand the calibration error.

EXPLANATION:

Attention: *For hardware connection details, please refer to the related hardware descriptions*

Exception codes:

1: Function code is not supported.
2: Out of beginning and ending address range.
3: Invalid value entrance or wrong byte number.
4: Operation error.

Command Examples:

Performing Read and Write operations according (Modbus TCP/IP High-Low) to hex system with the instrument set to address "0x01". MBAP (Modbus Application Protocol) Header is not included to the below Modbus TCP/IP application data units.

Below you will find some command samples;

Description	**Hex**
Request weight data	01,03,00,00,00,02
Answer of request weight (weight value is 100000)	01,03,04,00,01,86,A0
Request status data	01,03,00,02,00,01
Taring	01,10,00,08,00,01,02,00,02
Request tare data	01,03,00,03,00,02
Answer of request tare	01,03,04,00,00,27,10

(tare value is 10000)	
Zero Command	01,10,00,08,00,01,02,00,01
Request Calibration Status	01,03,00,20,00,01
Answer of request Calibration Status (Instrument is ready for calibration)	01,03,02,00,01
Zero Calibration	01,10,00,1D,00,01,02,00,BC
Span Calibration Command with Span value 50000	01,10,00,1D,00,03,06,00,DC,00,00,C3,50
Total LC capacity Command with Total LC capacity value 100000	01,10,00,1D,00,03,06,00,EC,00,01,86,A0
Average mV/V Command with Average mV/V value 1.9999	01,10,00,1D,00,03,06,00,FA,00,00,4E,1F
Dead load Command with Dead load value 12345	01,10,00,1D,00,03,06,00,AB,00,00,30,39
Save the coefficients of eCal Command	01,10,00,1D,00,01,02,5A,A5
Read Voltage of Power Supply value	01,03,00,63,00,01
Answer of Voltage of Power Supply (Voltage of Power Supply is 23,5 V)	01,03,02,00,EB
Read digital inputs	01,03,00,C7,00,01
Answer of digital inputs (Input-2 is active)	01,03,02,00,02
Read digital outputs	01,03,00,C8,00,01
Answer of digital outputs (Output-3 is Active)	01,03,02,00,04
Read Setpoint-1 Low	01,03,00,C9,00,02
Answer of Setpoint-1 Low	01,03,04,00,00,03,E8
Load Set point 1 Low = 5000	01,10,00,C9,00,02,04,00,00,13,88

11 CANOPEN (ONLY FT-10 CO)

After programming CANopen related parameters of the FT-10 PB indicator, you can communicate with the instrument. **EDS file** is available on www.flintec.com
Automatically detected and supported baud rates are 10 kbps, 50 kbps, 100 kbps, 125 kbps, 250 kbps, 500 kbps, 800 kbps, 1 Mbps, Autobaud (default).

[07-] CANopen

This sub-block includes the parameters related with the CANopen interfaces of FT-10 indicator.

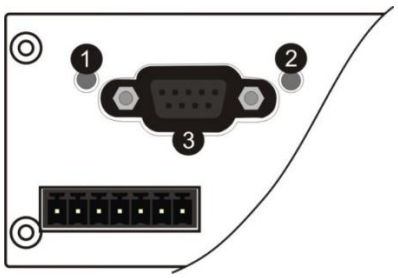
[070 0] Data Format

0 : Signed 32 bit integer, no decimal point implied
1 : 32 bit float, decimal point implied

[071 000] Rack Address

The CANopen rack address of FT-10 will be entered via keypad between 001 to 126.

There are 2 LED's near the CANopen connector which are;



1	Run LED
2	Error LED
3	CANopen interface

Run LED

State	Indication	Comment
Off	Not online / No power	Check power and cable
Green	On-line, data exchange	-
Green, blinking	On-line, initializing	-
Green, single flash	Stopped	Check hardware damages
Green, flickering	Auto baudrate detection in progress	-
Red	CANopen configuration error	Check EDS file

Error LED

State	Indication	Comment
Off	-	No power or CANopen module is in initialization state
Red, single flash	Warning limit reached	A bus error counter reached or exceeded its warning level
Red, flickering	LSS	LSS services in progress
Red, double flash	Error count event	A guard- (NMT-Slave or NMT-master) or heartbeat event (Heartbeat consumer) has occurred.
Red	Bus off (Fatal Event)	Bus off.

11.1Data Format

Data format of weight value can be programmable for Floating point (IEEE 754) or Integer. Refer to parameter [070].

11.2EDS Configuration

CANopen data structures of FT-10 CO includes 1 x TxPDO (64 bit) and 1 x RxPDO (64 bit). EDS configuration for PLC programmers is shown in Figure 11.1.

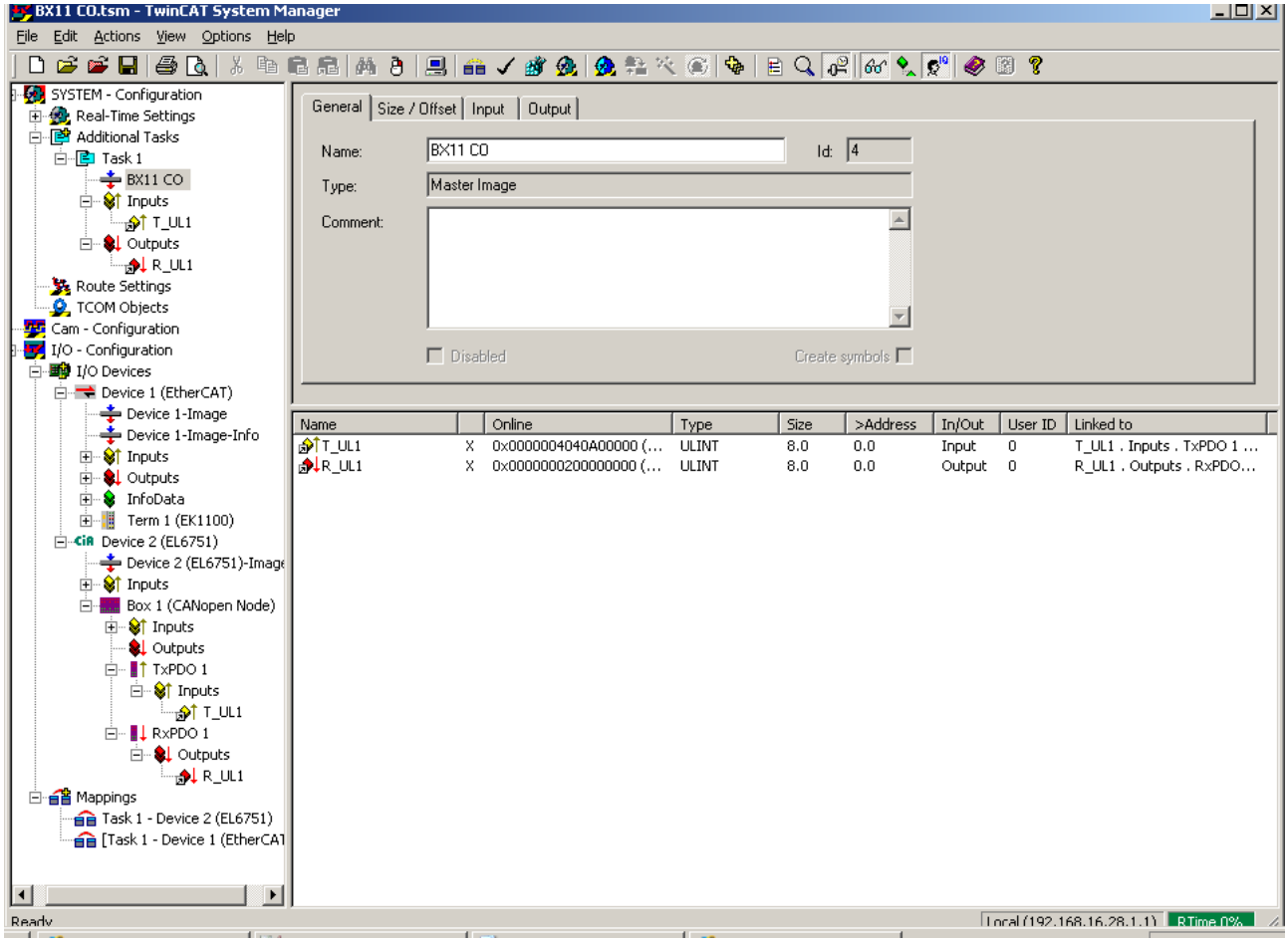


Figure 11.1 - EDS Configuration

ESD Configuration	Description
TxPDO 1 (4 words)	Unsigned Long (FT-10 CO Output to PLC Input)
RxPDO 1 (4 words)	Unsigned Long (PLC Output to FT-10 CO Input)

11.3 CANopen Data Structure

FT-10 CO Output to PLC Input

Bitwise of a Ulong:

Unsigned Long (Only read)	D63	D62	D61	D60	D59	D58	D57	D56	D55	D54	D53	D52	D51	D50	D49	D48
	D47	D46	D45	D44	D43	D42	D41	D40	D39	D38	D37	D36	D35	D34	D33	D32
	D31	D30	D29	D28	D27	D26	D25	D24	D23	D22	D21	D20	D19	D18	D17	D16
	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0

TxPDO 1 (T_UL1)	Zero-range	Error output		Out 5	Out 4	Out 3	Out 2	Out 1					In 4	In 3	In 2	In 1
	Error codes of FT-10 CO				Not in use			Centre of zero	Gross Net	MD	Read command response					Cmd Flg
	By default, Indicated weight value is represented. To represent other weight or calibration status, refer to D33…D37.															

FT-10 CO Output to PLC Input TxPDO 1 (T_UL1)

Bit Number	TxPDO 1 (T_UL1) Description			
D31	Zero range output status (ref Parameter [116]			(Active = 1)
D30	Error output status			(Active = 1)
D63 … D56	Outputs	Output bit status (Active = 1)		
D55 … D48	Inputs	Input bit status (Active = 1)		
D47 … D44	Error Codes of FT-10 CO	Bin	Dec	
		0000	0	No error found
		0001	1	ADC out
		0010	2	ADC over
		0011	3	ADC under
		0100	4	System Error
		0101	5	In programming mode
		0110	6	Low/High Voltage Error
D43 … D41	Not in use			
D40	Centre of Zero	0		Weight is out of zero range
		1		Weight is in zero range
D39	Indication	0		Gross
		1		Net
D38	MD – Motion Detection	0		Stable
		1		Dynamic
D37 … D33	Read Command Response	00000	0	Indicated weight
		00001	1	Gross weight
		00010	2	Tare weight
		00011	3	Calibration Status (Refer to Table 11.1)
		00100 01110	4 14	Not used
		01111	15	Set Point-1 Low
		10000	16	Set Point-1 High
		10001	17	Set Point-2 Low
		10010	18	Set Point-2 High
		10011	19	Set Point-3 Low
		10100	20	Set Point-3 High
		10101	21	Set Point-4 Low
		10110	22	Set Point-4 High
		10111	23	Set Point-5 Low

		11000	24	Set Point-5 High
		11111	31	Use the Expanded Command list (Refer to Table 11.2)
D32	CMD Flag	Toggles		The command is applied successfully
D31…D0	By default, Indicated weight value is represented. To represent other weight or calibration status, refer to D33~D37.			

Calibration Status (always 32 bit integer)

Low Dword of TxPDO 1 (T_UL1) descriptions when read command is 'Calibration Status'. Refer to RxPDO 1 (R_UL1) of 'PLC Output to FT-10 CO Input'.

Bit Number	Low Dword of TxPDO 1 (T_UL1) Description			
D31 … D16	Not in use			
D15 … D8	Calibration Errors	Bin	Dec	Descriptions
		0000 0001	1	Calibration Timeout - Restart calibration
		0000 0010	2	ADC Error - Re-energize the instrument
		0000 0011	3	Instrument cannot be calibrating - Check load cell cable - Re-energize the instrument
		0010 0010	34	Instrument cannot be calibrating - Load cell signal is very low or too high
		0010 0011	35	Calibration Error - Calibration loading is not enough - Check test weight loading (Write test weight value to RxPDO 1 (R_DW1) of PLC Output to FT-10 CO Input then restart the calibration) - Check load cell connections
		0010 0100	36	Calibration load value entry Error - Test weight is too small. Increase the test weight
		0010 0101	37	Scale unstable - Wait until scale become stable - Check grounding wiring
		0010 0110	38	The Calibration DIP switch is not ON position. - Check the calibration DIP switch.
D7 ... D0	Calibration Process Status	0000 0001	1	System ready for calibration
		0000 0011	3	Zero calibration in process
		0000 0100	4	Span calibration in process
		0000 1001	9	Error (Refer to Calibration Errors)

Table 11.1 - Calibration status

PLC Output to FT-10 CO Input
Bitwise of a Ulong:

Unsigned Long (R/W)	D63	D62	D61	D60	D59	D58	D57	D56	D55	D54	D53	D52	D51	D50	D49	D48
	D47	D46	D45	D44	D43	D42	D41	D40	D39	D38	D37	D36	D35	D34	D33	D32
	D31	D30	D29	D28	D27	D26	D25	D24	D23	D22	D21	D20	D19	D18	D17	D16
	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0

RxPDO 1 (R_UL1)				Out 5	Out 4	Out 3	Out 2	Out 1	Expanded Commands List		
	Not in use					Command List			Read Data Selection		New CMD
	D33~D37 bits defines the usage of this Dword.										

PLC Output to FT-10 CO Input RxPDO 1 (R_UL1)

Bit Number	RxPDO 1 (R_UL1) descriptions				
D63 … D56	Set / Reset digital outputs				
D55 … D48	Expanded Commands List (Refer to Table 11.2)				
D47 ... D43	Not in use				
D42 … D38	Command List	Bin	Dec	Commands	
		00000	0	None command is activated	
		00001	1	Zero	
		00010	2	Tare	
		00011	3	Clear	
		00100	4	Print	
		00101	5	Adjust zero calibration	Calibration
		00110	6	Adjust span calibration (1)	
		00111	7	Total Load Cell Capacity (1)	eCal Coefficients Refer to par. [313]
		01000	8	Average mV/V value (1)	
		01001	9	Dead Load value (1)	
		01010	10	Save the coefficients of eCal	
		01011 01110	11 14	Not used	
		01111	15	Set Point-1 Low (1)	
		10000	16	Set Point-1 High (1)	
		10001	17	Set Point-2 Low (1)	
		10010	18	Set Point-2 High (1)	
		10011	19	Set Point-3 Low (1)	
		10100	20	Set Point-3 High (1)	
		10101	21	Set Point-4 Low (1)	
		10110	22	Set Point-4 High (1)	
		10111	23	Set Point-5 Low (1)	
		11000	24	Set Point-5 High (1)	
		11111	31	Use the Expanded Command list (Refer to Table 11.2)	
D37 ... D33	Read Data Selection	00000	0	Indicated weight	
		00001	1	Gross weight	
		00010	2	Tare weight	
		00011	3	Calibration Status (Refer to Table 11.1)	
		00100 01110	4 14	Not used	
		01111	15	Set Point-1 Low (2)	
		10000	16	Set Point-1 High	

		10001	17	Set Point-2 Low (2)
		10010	18	Set Point-2 High
		10011	19	Set Point-3 Low (2)
		10100	20	Set Point-3 High
		10101	21	Set Point-4 Low (2)
		10110	22	Set Point-4 High
		10111	23	Set Point-5 Low (2)
		11000	24	Set Point-5 High
		11111	31	Use the Expanded Command list (Refer to Table 11.2)
D32	New CMD	Toggle		Apply commands which are listed in this table
D31~D0	D33~D37 bits defines the usage of this Dword.			

(1) Write this command with writing values to D0…D31 bits then apply New CMD.
(2) Only set point low addresses are used if the set point is programmed as standard.

Expanded Command List (always 32 bit integer)
The "D48 … D55" bits in RxPDO describes below.

Bit No	**Description**						
D48…D55	Expanded Commands List	Bin	Dec	Commands			
		00000000	0	R	Voltage of Power Supply	Voltage of power supply is indicated with 0.1 VDC increment.	
		00000001 00111111	1 63	Not in use			
		01000000	64	RW	Filter (1)	Refer to par. [120], page 37	
		01000001	65	RW	Power On Zero (1)	Refer to par. [202], page 39	
		01000010	66	RW	Zeroing Range (1)	Refer to par. [203], page 39	
		01000011	67	RW	Auto Zero Tracking (1)	Refer to par. [204], page 39	
		01000100	68	RW	Tare (1)	Refer to par. [205], page 39	
		01000101	69	RW	Motion Detector (1)	Refer to par. [206], page 39	
		01000110	70	RW	Stability Period (1)	Refer to par. [207], page 39	
		01000111	71	RW	Operation mode (1)	Refer to par. [210], page 40	
		01001000	72	RW	Capacity (1)	Refer to par. [212], page 40	
		01001001	73	RW	Decimal point (1)	0	XXXXOO
						1	XXXXXO
						2	XXXXXX
						3	XXXXX.X
						4	XXXX.XX
						5	XXX.XXX
		01001010	74	RW	Increment (1)	1	X1
						2	X2
						3	X5

Table 11.2 - Expanded Command List

(1) Write this command with writing values to D0~D31 bits then apply New CMD.

Programming steps of frequent used ……
Reading a weight value:
1. Check the D44…D47 bits of 'TxPDO 1 (T_UL1)'.
2. If there is not any error, read a weight value gross, net or tare),

Zero Calibration procedure:
1. Check the low byte of Calibration Status. it should be decimal '1' to start adjustment.
2. Write 'Adjust Zero Calibration' command and apply New CMD to start Zero calibration.
3. Check the low byte of Calibration Status. it is decimal '3' during zero calibration process.
4. The low byte of Calibration Status changes to decimal '1' at the end of the Zero calibration.
5. If the low byte of Calibration Status is '9', check the high byte of Calibration Status to understand the calibration error.

Span Calibration procedure:
1. Check the low byte of Calibration Status. it should be decimal '1' to start adjustment.
2. Write 'Adjust Span Calibration' command with writing test weight values to Low Dword of RxPDO1 (R_UL1), then apply New CMD to start Span calibration.
3. Check the low byte of Calibration Status. it is decimal '4' during span calibration process.
4. The low byte of Calibration Status changes to decimal '1' at the end of the Span calibration.
5. If the low byte of Calibration Status is '9', check the high byte of Calibration Status to understand

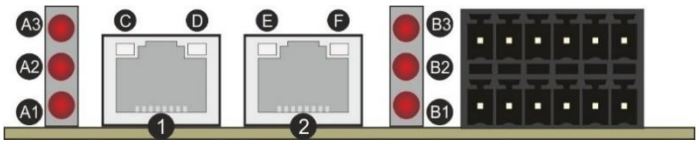
the calibration error.

12 ETHERNET/IP (ONLY FT-10 EI)

EtherNet/IP interface of the weighing instrument can be done via hub switch or serial bus over two EtherNet/IP port.

1. Serial bus connection of instruments. You may connect instruments serial to your EtherNet/IP bus via two ports.
2. Star connection. If you connect the instrument to your PLC via hub switch, you can use P1 or P2 port on the instrument. You may change the port if there is any malfunction on port in usage.

The EtherNet/IP interface supports 10/100Mbit, full or half duplex operation. **EDS file** for two ports EtherNet/IP is available under www.flintec.com.
There are announcement LEDs on the instrument to indicate the interface status as seen below.
The meanings of these LED's are;



Ref.	Definition	Ref.	Definition	Ref.	Definition
A3	Network Error LED	B3	Module Error LED	1,2	Interface ports (P1, P2)
A2	Not used	B2	Not used	E,F	Link/Activity LEDs for P2
A1	Network Status LED	B1	Module Status LED	C,D	Link/Activity LEDs for P1

A1 Network Status LED

LED State	Description
Off	No IP address
On	Online, one or more connections established (CIP Class 1 or 3)
Flashing	Online, no connections established

A3 Network Error LED

LED State	Description
Off	No error
On	Duplicate IP address, FATAL error
Flashing	One or more connections timed out (CIP Class 1 or 3)

B1 Module Status LED

LED State	Description
Off	No power
On	Controlled by a scanner in run state
Flashing	Not configured, or scanner in idle state

B3 Module Error LED

LED State	Description
Off	No Error
On	Major fault (EXCEPTION state, FATAL error etc.)
Flashing	Recoverable fault(s)

In the case of LED warning, check cabling, configuration, IP address and device name. Power off the instrument and reenergize the instrument 30 seconds later.

C,D,E,F LINK/Activity LED

LED State	Description
Off	No link, no activity
Green	Link (100 Mbit/s) established
Green, flickering	Activity (100 Mbit/s)
Yellow	Link (10 Mbit/s) established
Yellow, flickering	Activity (10 Mbit/s)

12.1 Data Format

Data format of weight value can be programmable for Floating point (IEEE 754) or Integer. Refer to parameter [060].

12.2 EtherNet/IP Parameters

There are 7 parameters for EtherNet/IP network and EtherNet/IP set up is done by IndFace1x (Indface1x) PC-software over Local Network Area as described in this section.
Indface1x PC software is available under www.flintec.com.

DHCP
Dynamic Host Configuration Protocol automates network parameters if it is enabled.
Default is 'Enable'.

IP Address
If DHCP is disabled, obtain IP address manually.

Subnet Mask
If DHCP is disabled, obtain subnet mask manually.

Default Gateway
If DHCP is disabled, obtain default gateway manually.

Primary DNS
If DHCP is disabled, obtain primary DNS manually.

Secondary DNS
If DHCP is disabled, obtain secondary DNS manually.

Host Name
Enter a unique host name to the instrument.
Default is ' '.

12.3 EDS Configuration

EtherNet/IP data structures of FT-10 includes 2 x Input 2 words and 2 x Output 2 words. EDS configuration for PLC programmers is shown in **Figure 12.1** and **Figure 12.2**.

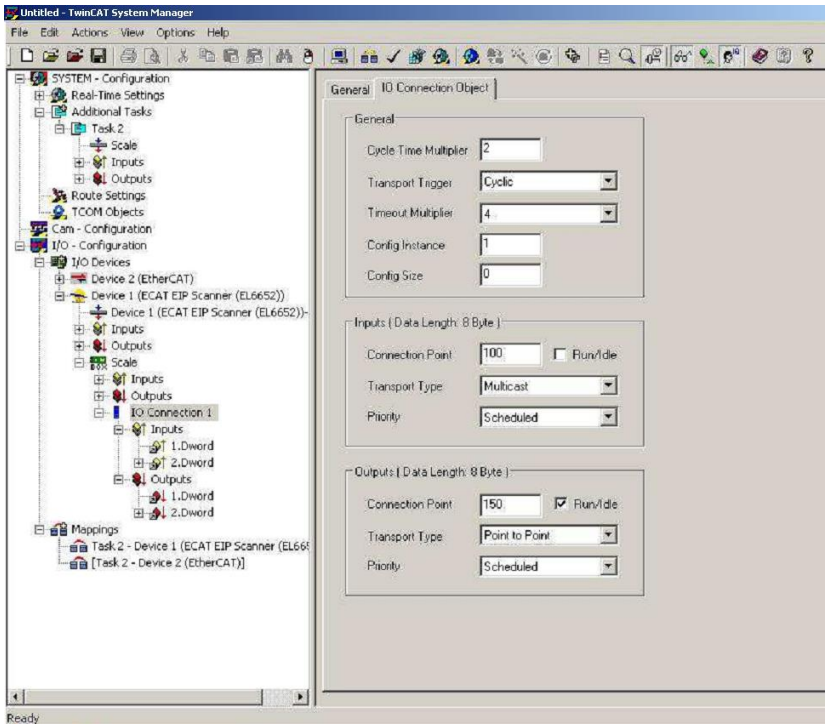


Figure 12.1 – Configuration of module properties without EDS file

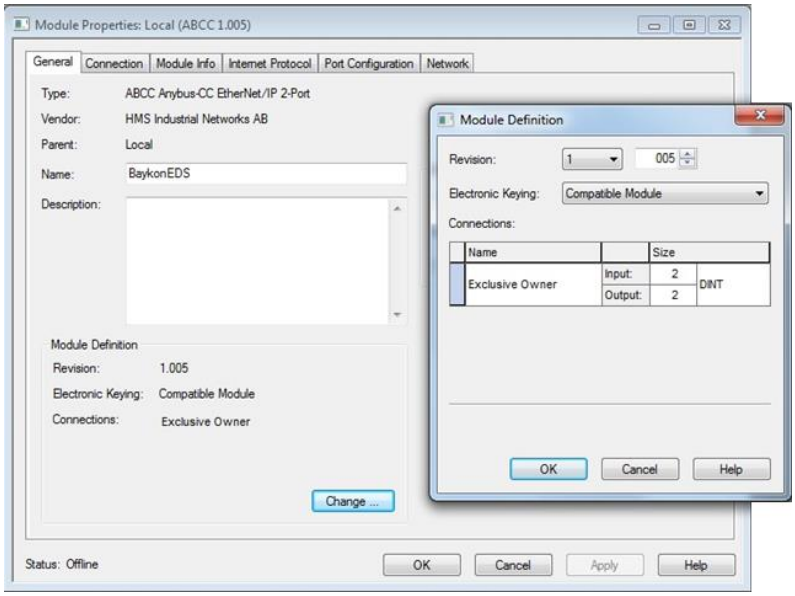


Figure 12.2 – Configuration of module properties with EDS file

Data Length	Description
Input 2 words	1st Dword (FT-10 Output to PLC Input)
Input 2 words	2nd Dword (FT-10 Output to PLC Input)
Output 2 words	1st Dword (PLC Output to FT-10 Input)
Output 2 words	2nd Dword (PLC Output to FT-10 Input)

12.4EtherNet/IP, EtherCAT, CC-Link, Powerlink Data Structure

FT-10 EI / EC / CC-Link / PL Output to PLC Input

Dword (Only read)	D31	D30	D29	D28	D27	D26	D25	D24	D23	D22	D21	D20	D19	D18	D17	D16
	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0

1st Dword (Input)	By default, Indicated weight value is represented. To represent other weight or calibration status, refer to next Dword.															
2nd Dword (Input)	Zero-Range	Error output		Out 5	Out 4	Out 3	Out 2	Out 1					In 4	In 3	In 2	In 1
	Error codes of FT-10				Not in use			Centre of zero	Gross Net	MD	Read command response					Cmd Flg

FT-10 Output to PLC Input 2nd Dword Input

Bit Number	2nd Dword Description			
D31	Zero range output status (ref. Parameter [116]			(Active = 1)
D30	Error output status			(Active = 1)
D29 … D24	Outputs	Output bit status (Active = 1)		
D23 … D16	Inputs	Input bit status (Active = 1)		
D15 … D12	Error Codes of FT-10	Bin	Dec	
		0000	0	No error found
		0001	1	ADC out
		0010	2	ADC over
		0011	3	ADC under
		0100	4	System Error
		0101	5	In programming mode
		0110	6	Low/High Voltage Error
D11 … D9	Not in use			
D8	Centre of zero	0		Weight is out of zero range
		1		Weight is in zero range
D7	Indication	0		Gross
		1		Net
D6	MD – Motion Detection	0		Stable
		1		Dynamic
D5 … D1	Read Command Response	00000	0	Indicated weight
		00001	1	Gross weight
		00010	2	Tare weight
		00011	3	Calibration Status (Refer to Table 12.1)
		00100 01110	4 14	Not used
		01111	15	Set Point-1 Low
		10000	16	Set Point-1 High
		10001	17	Set Point-2 Low
		10010	18	Set Point-2 High
		10011	19	Set Point-3 Low
		10100	20	Set Point-3 High
		10101	21	Set Point-4 Low
		10110	22	Set Point-4 High
		10111	23	Set Point-5 Low
		11000	24	Set Point-5 High
		11111	31	Use the Expanded Command list (Ref. Table 12.2)
D0	CMD Flag	Toggles		The command is applied successfully

Calibration Status (always 32 bit integer)

1st Dword descriptions when read command is 'Calibration Status'.
Refer to 2nd Dword of PLC Output to FT-10 Input.

Bit Number	1st Dword Description			
D31 … D16	Not in use			
D15 … D8	Calibration Errors	Bin	Dec	Descriptions
		0000 0001	1	Calibration Timeout - Restart calibration
		0000 0010	2	ADC Error - Re-energize the instrument
		0000 0011	3	Instrument can not be calibrating - Check load cell cable - Re-energize the instrument
		0010 0010	34	Instrument can not be calibrating - Load cell signal is very low or too high
		0010 0011	35	Calibration Error - Calibration loading is not enough - Check test weight loading (Write test weight value to 1st Dword of PLC Output to FT-10 Input then restart the calibration) - Check load cell connections
		0010 0100	36	Calibration load value entry Error - Test weight is too small. Increase the test weight
		0010 0101	37	Scale unstable - Wait until scale become stable - Check grounding wiring
		0010 0110	38	The Calibration DIP switch is not ON position. - Check the calibration DIP switch.
D7 ... D0	Calibration Process Status	0000 0001	1	System ready for calibration
		0000 0011	3	Zero calibration in process
		0000 0100	4	Span calibration in process
		0000 1001	9	Error (Refer to Calibration Errors)

Table 12.1 - Calibration status

PLC Output to FT-10 EI/CAT/CC-Link Input

Dword (R/W)	D31	D30	D29	D28	D27	D26	D25	D24	D23	D22	D21	D20	D19	D18	D17	D16
	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0

1st Dword (Output)	Next Dword defines the usage of this Dword.										
2nd Dword (Output)				Out 5	Out 4	Out 3	Out 2	Out 1	Expanded Commands List		
	Not in use					Command List			Read Data Selection		New CMD

PLC Output to FT-10 Input 2nd Dword Output

Bit Number	2rd Dword descriptions				
D31 … D24	Set / Reset digital outputs				
D23 … D16	Expanded Commands List (Refer to Table 12.2)				
D15 … D11	Not in use				
D10 … D6	Command List	Bin	Dec	Commands	
		00000	0	None command is activated	
		00001	1	Zero	
		00010	2	Tare	
		00011	3	Clear	
		00100	4	Print	
		00101	5	Adjust zero calibration	Calibration
		00110	6	Adjust span calibration (1)	
		00111	7	Total Load Cell Capacity (1)	eCal Coefficients Refer to par. [313]
		01000	8	Average mV/V value (1)	
		01001	9	Dead Load value (1)	
		01010	10	Save the coefficients of eCal	
		01011 01110	11 14	Not used	
		01111	15	Set Point-1 Low (1)	
		10000	16	Set Point-1 High (1)	
		10001	17	Set Point-2 Low (1)	
		10010	18	Set Point-2 High (1)	
		10011	19	Set Point-3 Low (1)	
		10100	20	Set Point-3 High (1)	
		10101	21	Set Point-4 Low (1)	
		10110	22	Set Point-4 High (1)	
		10111	23	Set Point-5 Low (1)	
		11000	24	Set Point-5 High (1)	
		11111	31	Use the Expanded Command list (Refer to Table 12.2)	
D5 ... D1	Read Data Selection	00000	0	Indicated weight	
		00001	1	Gross weight	
		00010	2	Tare weight	
		00011	3	Calibration Status (Refer to Table 12.1)	
		00100 01110	4 14	Not used	
		01111	15	Set Point-1 Low (2)	
		10000	16	Set Point-1 High	
		10001	17	Set Point-2 Low (2)	
		10010	18	Set Point-2 High	
		10011	19	Set Point-3 Low (2)	
		10100	20	Set Point-3 High	
		10101	21	Set Point-4 Low (2)	
		10110	22	Set Point-4 High	
		10101	21	Set Point-4 Low (2)	
		10110	22	Set Point-4 High	
		10111	23	Set Point-5 Low (2)	
		11000	24	Set Point-5 High	
		11111	31	Use the Expanded Command list (Refer to Table 12.2)	
D0	New CMD	Toggle		Apply commands which are listed in this table	

(1) Write this command after writing values to 1st Dword, then apply this command with New CMD

(2) Only set point low addresses are used if the set point is programmed as standard.

Expanded Command List (always 32 bit integer)
The "D23 … D16" bits in 2nd Dword describes below.

Bit No	Description						
D23…D16	Expanded Commands List	Bin	Dec	Commands			
		00000000	0	R	Voltage of Pwr Supp.	Indicated with 0.1 VDC increment	
		00000001 00111111	1 63	Not in use			
		01000000	64	RW	Filter (1)	Refer to par. [120], page 37	
		01000001	65	RW	Power On Zero (1)	Refer to par. [202], page 39	
		01000010	66	RW	Zeroing Range (1)	Refer to par. [203], page 39	
		01000011	67	RW	Auto Zero Tracking (1)	Refer to par. [204], page 39	
		01000100	68	RW	Tare (1)	Refer to par. [205], page 39	
		01000101	69	RW	Motion Detector (1)	Refer to par. [206], page 39	
		01000110	70	RW	Stability Period (1)	Refer to par. [207], page 39	
		01000111	71	RW	Operation mode (1)	Refer to par. [210], page 40	
		01001000	72	RW	Capacity (1)	Refer to par. [212], page 40	
		01001001	73	RW	Decimal point (1)	0	XXXXOO
						1	XXXXXO
						2	XXXXXX
						3	XXXXX.X
						4	XXXX.XX
						5	XXX.XXX
		01001010	74	RW	Increment (1)	1	X1
						2	X2
						3	X5

Table 12.2 - Expanded Command List

(1) Write this command after writing values to 1st Dword then apply this command with New CMD.

Programming steps of frequent used ……
Reading a weight value:
1. Check the D12…D15 bits of 'FT-10 Output to PLC Input 2nd Dword'.
2. If there is not any error, read a weight value (gross, net or tare),

Zero Calibration procedure:
1. Check the low byte of Calibration Status. it should be decimal '1' to start adjustment.
2. Write 'Adjust Zero Calibration' command and apply New CMD to start Zero calibration.
3. Check the low byte of Calibration Status. it is decimal '3' during zero calibration process.
4. The low byte of Calibration Status changes to decimal '1' at the end of the Zero calibration.
5. If the low byte of Calibration Status is '9', check the high byte of Calibration Status to understand the calibration error.

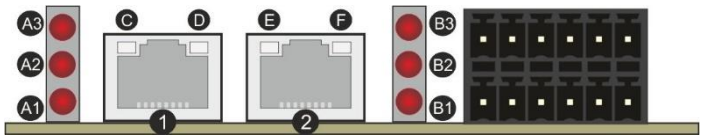
Span Calibration procedure:
1. Check the low byte of Calibration Status. it should be decimal '1' to start adjustment.
2. Write 'Adjust Span Calibration' command after writing test weight values to 1st Dword, then apply this command with New CMD to start Span calibration.
3. Check the low byte of Calibration Status. it is decimal '4' during span calibration process.
4. The low byte of Calibration Status changes to decimal '1' at the end of the Span calibration.
5. If the low byte of Calibration Status is '9', check the high byte of Calibration Status to understand the calibration error.

13 ETHERCAT (ONLY FT-10 EC)

EtherCAT interface can be done via hub switch or serial bus over two EtherCAT ports.

1. Serial bus connection of instruments. You may connect instruments serial to your EtherCAT bus via two ports.
2. Star connection. If you connect the instrument to your PLC via hub switch, you can use P1 port on the instrument.

The EtherCAT interface supports 100Mbit, full duplex operation.
ESI file for two ports EtherCAT is available under www.flintec.com.
There are announcement LEDs on the instrument to indicate the interface status as seen below.



Ref.	Definition	Ref.	Definition	Ref.	Definition
A3	Network Error LED	B3	Not used	1,2	Interface ports (IN, OUT)
A2	Not used	B2	Not used	D,F	Not used
A1	Network Status LED	B1	Module Status LED	C,E	Link/Activity LEDs

A1 Network Status LED

LED State	Description
Off	INIT
On	OPERATIONAL
Blinking	PRE-OPERATIONAL
Single flash	SAFE-OPERATIONAL

A3 Network Error LED

LED State	Description
Off	No error
On	(Fatal Event)

B1 Module Status LED

LED State	Description
Off	No any error (or no power)
Blinking	Invalid configuration; State change received from master is not possible due to invalid register or object settings.
Single flash	Unsolicited state change; Slave device application has changed the EtherCAT state autonomously.
Double flash	Application watchdog timeout
On	Application controller failure

In the case of LED warning, check cabling, configuration, IP address and device name. Power off the instrument and reenergize the instrument 30 seconds later.

C,E LINK/Activity LED

LED State	Description
Off	No link, no activity.
Green	Link sensed, no activity.
Green, flickering	Link sensed, activity exist.

13.1Data Format

Data format of weight value can be programmable for Floating point (IEEE 754) or Integer. Refer to parameter [060].

13.2ESI Configuration

EtherCAT data structures of FT-10 includes 2 x Input 2 words and 2 x Output 2 words. ESI configuration for PLC programmers is shown in **Figure 13.1**.

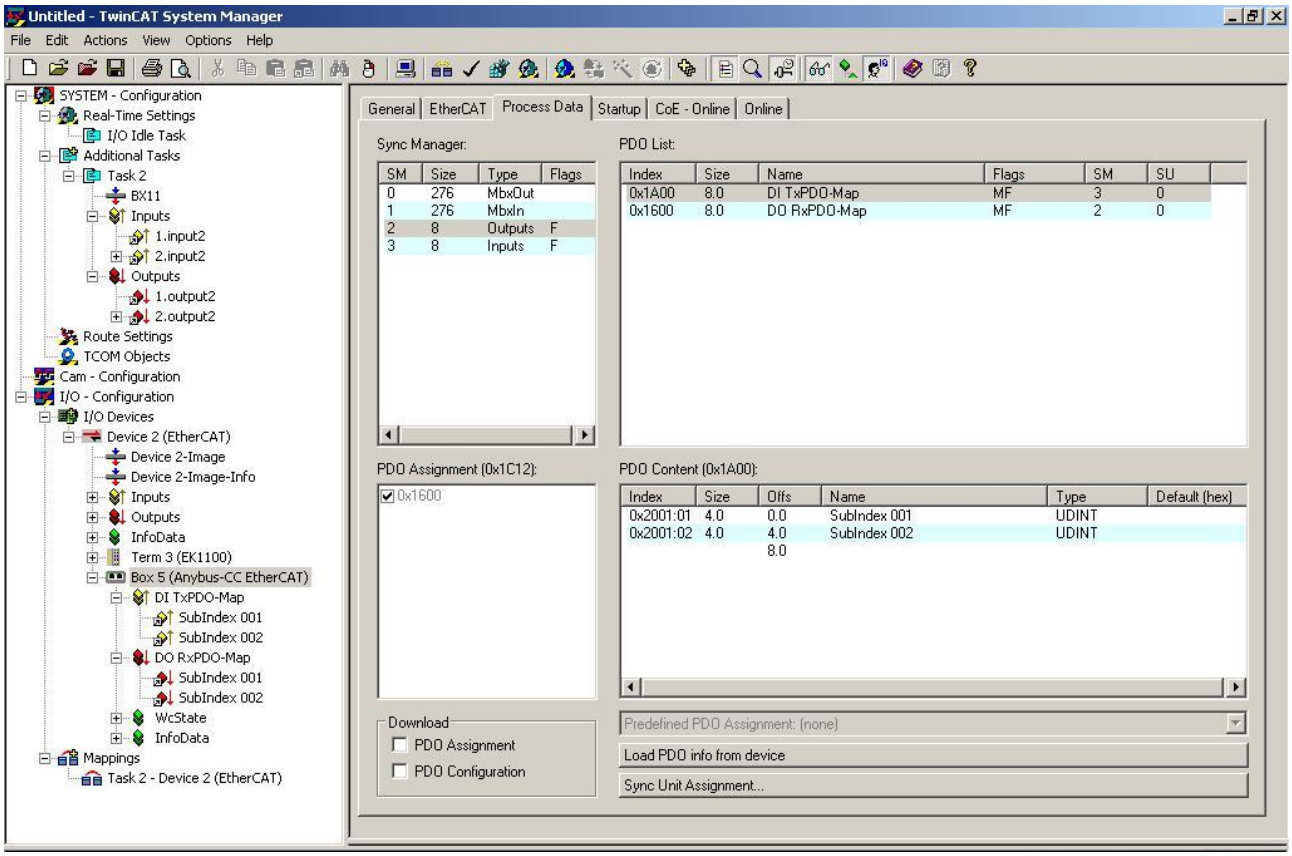


Figure 13.1 – Configuration of module properties for Beckhoff

Input/Output	Definition	Description
DI TxPDO-Map	SubIndex 001	1st Dword (FT-10 Output to PLC Input)
	SubIndex 002	2nd Dword (FT-10 Output to PLC Input)
DO RxPDO-Map	SubIndex 001	1st Dword (FT-10 Output to FT-10 Input)
	SubIndex 002	2nd Dword (FT-10 Output to FT-10 Input)

13.3EtherCAT Data Structure

Please see the EtherNET/IP Data Structure that is the same like for EtherCAT. Refer to page 86.
ESI configuration for PLC programmers, same as for EtherNET/IP, is shown on Page 86

14 CC-LINK (ONLY FT-10 CC)

After setting related parameters to can communicate with the indicator via CC-Link network. Supported CC-Link version is v1.10 and baud rates are 156 kbps (default), 625 kbps, 2,5 Mbps, 5 Mbps and 10 Mbps.

[07-] CC-Link (Only FT-10CO, CC)

This sub-block includes the parameters related with the CC-Link interfaces of FT-10 FILL indicator.

[070 0] Data Format

0 : Signed 32 bit integer, no decimal point implied
1 : 32 bit float, decimal point implied

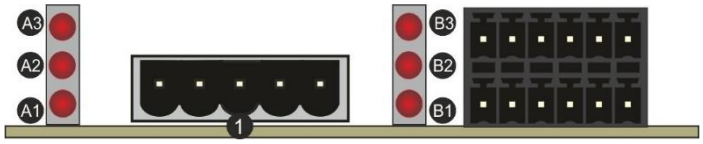
[071 000] Rack Address

The CANopen rack address of FT-10 will be entered via keypad between 001 to 126.

[072 000] Baudrate

0 : 156kbps 1 : 625kbps 2 : 2.5kbps
3 : 5Mbps 4 : 10Mbps

There are LED's near the CC-Link connector which are;



Ref.	Definition	Ref.	Definition	Ref.	Definition
A3	Operation Error LED	B3	Not used		
A2	Not used	B2	Not used		
A1	Operation mode LED	B1	Module Error LED	1	CC-Link port

A1 Operation mode LED

LED State	Description
Off	No network participation, timeout status (no power)
On	Participating, normal operation

A3 Operation Error LED

LED State	Description
Off	No error
On	Major fault (FATAL error)

B1 Module Error LED

LED State	Description
Off	No error detected (no power)
On	Major fault (Exception or FATAL event)
Flickering	CRC error (temporary flickering)
Flashing	Station Number or Baud rate has changed since startup (flashing)

In the case of red LED warning, check cabling, configuration and station number. Power off the instrument and reenergize the instrument 30 seconds later.

14.1Data Format

Data format of weight value can be programmable for Floating point (IEEE 754) or Integer. Refer to parameter [070].

14.2CC-Link Configuration

FT-10 has one occupied station area on CC-Link network and station type of FT-10 must be programmed as 'Remote device station' in the PLC software. CC-Link configuration for PLC programmers is shown in **Figure 14.1**.

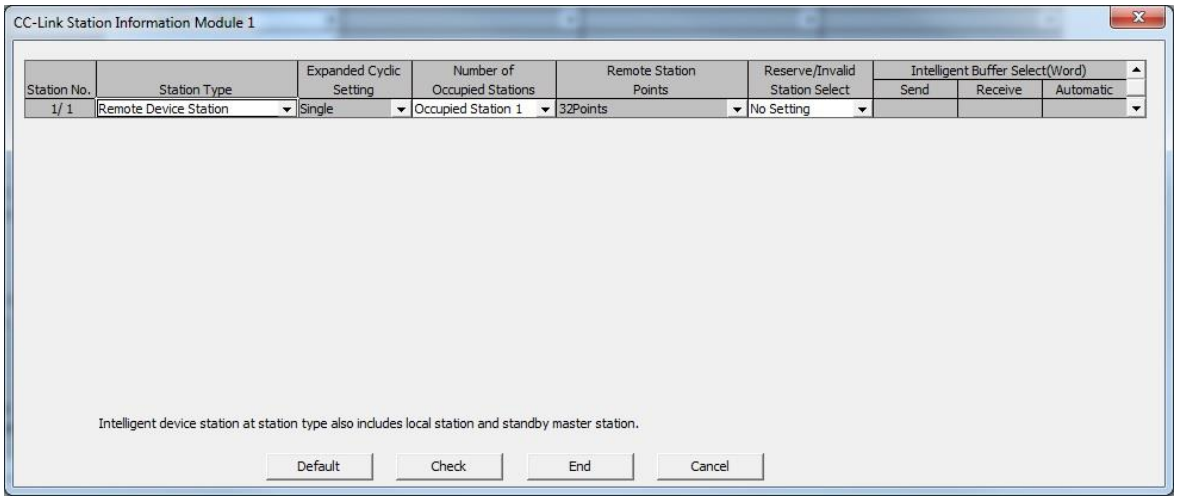


Figure 14.1 – Station information

Input/Output	Definition	Description
Remote Register (RWr)	RWr0, RWr1	1st Dword Input (FT-10 Output to PLC Input)
	RWr2, RWr3	2nd Dword Input (FT-10 Output to PLC Input)
Remote Input (RX)	RX0 ~ RX31	Not used
Remote Register (RWw)	RWw0, RWw1	1st Dword Output (PLC Output to FT-10 Input)
	RWw2, RWw3	2nd Dword Output (PLC Output to FT-10 Input)
Remote Output (RY)	RY0 ~ RY31	Not used

14.3CC-Link Data Structur

Please see the EtherNET/IP Data Structure that is the same like for EtherCAT. Refer to page 86.
ESI configuration for PLC programmers, same as for EtherNET/IP, is shown on Page 86

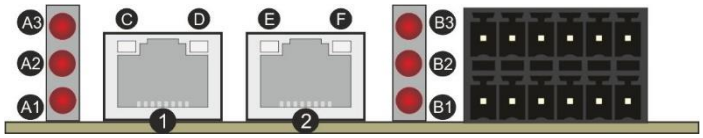
15 POWERLINK (ONLY FT-10 PL)

Powerlink interface can be done via hub switch or serial bus over two Powerlink port.

1. Serial bus connection of instruments. You may connect instruments serial to your Powerlink bus via two ports.
2. Star connection. If you connect the instrument to your PLC via hub switch, you can use P1 or P2 port on the instrument. You may change the port, if there is any malfunction on port in usage.

The Powerlink interface supports 100Mbit, full duplex operation.
XDD file for two ports Powerlink is available under www.flintec.com.

There are announcement LEDs on the instrument to indicate the interface status as seen below.



Ref.	Definition	Ref.	Definition	Ref.	Definition
A3	Network Error LED	B3	Not used	1,2	Interface ports (IN, OUT)
A2	Not used	B2	Not used	D,F	Not used
A1	Network Status LED	B1	Module Error LED	C,E	Link/Activity LEDs

A1 Network Status LED

LED State	Description
Off	Module is off, initializing, or not active.
Fast flashing[a]	NMT_CS_BASIC_ETHERNET Basic Ethernet state: no POWERLINK traffic has been detected.
Single flash	NMT_CS_PRE_OPERATIONAL_1. Only asynchronous data.
Double flash	NMT_CS_PRE_OPERATIONAL_2. Asynchronous and synchronous data. No PDO data.[b]
Triple flash	NMT_CS_READY_TO_OPERATE. Ready to operate. Asynchronous and synchronous data. No PDO data.[b]
On	NMT_CS_OPERATIONAL. Fully operational. Asynchronous and synchronous data. PDO data is sent and received.
Slow flashing[c]	NMT_CS_STOPPED Module stopped (for controlled shutdown, for example). Asynchronous and synchronous data. No PDO data.[b]

a. On 50 ms, off 50 ms.
b. Any process data sent is declared not valid and received process data must be ignored in this state.
c. On 200 ms, off 200 ms.

A3 Network Error LED

LED State	Description
Off	No error
On	If the MODULE ERROR LED also is On, a fatal event was encountered.

B1 Module Error LED

LED State	Description
Off	No error
On	If the NETWORK ERROR LED is Off, a non-fatal error has been detected. If the NETWORK ERROR LED is On, a fatal event was encountered.

In the case of LED warning, check cabling, configuration, IP address and device name. Power off the instrument and reenergize the instrument 30 seconds later.

C,E LINK/Activity LED

LED State	Description
Off	No link.
Green	Link, no traffic.
Green, flashing	Link and traffic.

15.1 Data Format

Data format of weight value can be programmable for Floating point (IEEE 754) or Integer. Refer to parameter [070].

15.2 XDD Configuration

Powerlink data structures consist of 2 pcs Input-2 words and 2 pcs Output-2 words. XDD configuration for PLC programmers is shown in **Figure 15.1**.

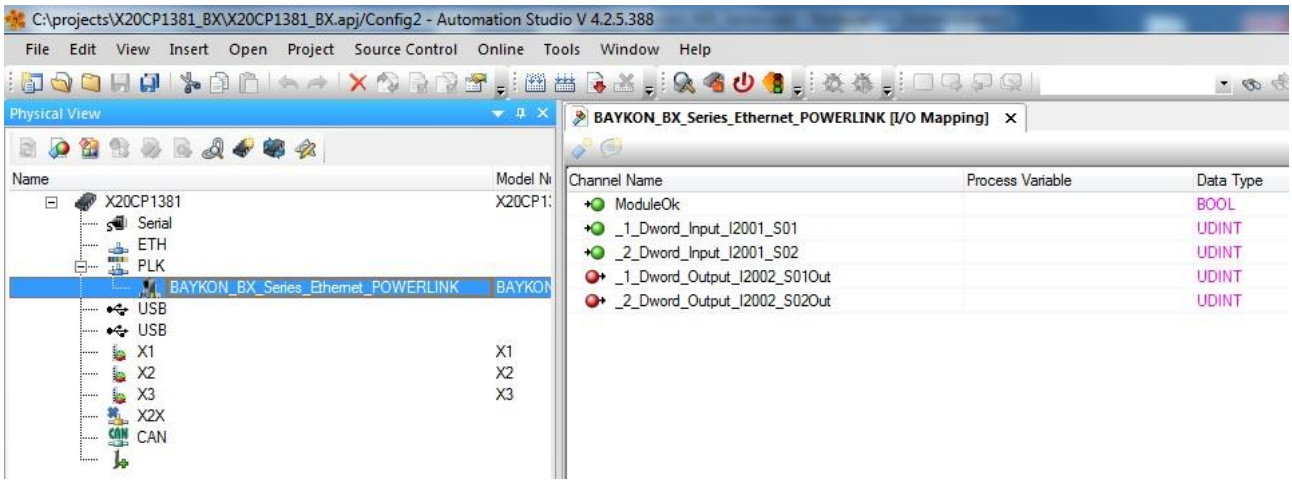


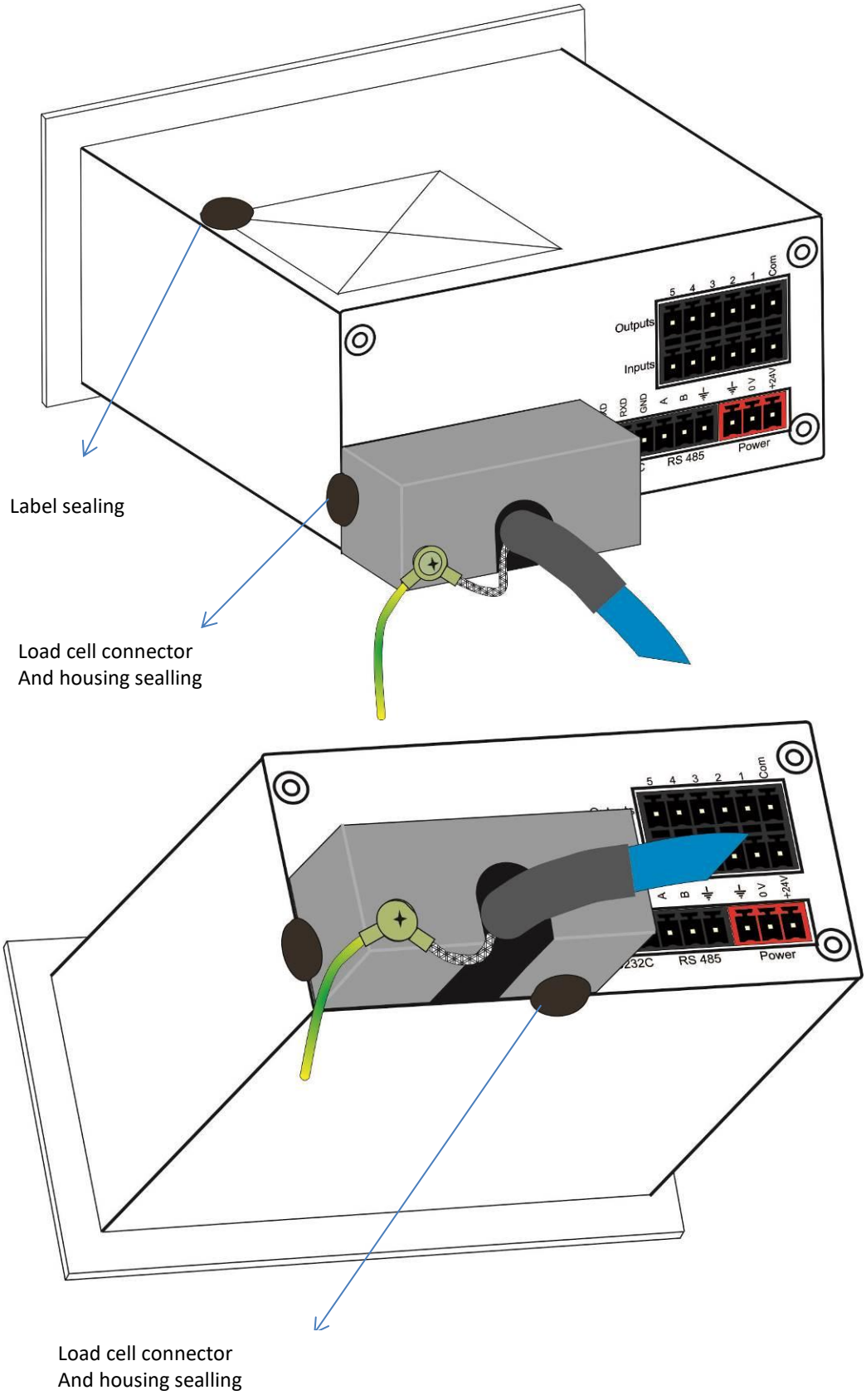
Figure 15.1 – Configuration of module properties with XDD file

Data Length	Description
1_Dword_Input_I2001_S01	1st Dword (FT-10 PL Output to PLC Input)
2_Dword_Input_I2001_S02	2nd Dword (FT-10 PL Output to PLC Input)
1_Dword_Output_I2002_S01Out	1st Dword (PLC Output to FT-10 PL Input)
2_Dword_Output_I2002_S02Out	2nd Dword (PLC Output to FT-10 PL Input)

15.3 Powerlink Data Structure

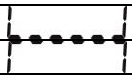
Please see the EtherNET/IP Data Structure that is the same like for EtherCAT. Refer to page 86.

16 APPROVED SEALING



17 ERROR CODES

FT-10 weighing indicator had been designed as a very reliable and virtually error free instrument. However, if an error occurs, do not attempt to repair the equipment before understanding what caused the error. Note the problems you have with your instrument and the error messages shown on the display. Then try to solve the problem according to the error table given below.

ERROR CODE	DESCRIBTION	THINGS TO DO
	Weight is too low	- Check the load - Load cell or instrument could be broken.
	Over Load	
LC Err	Load exceeds the operation range	- Check the load - Check the calibration - Load cell or instrument could be broken.
Err 1	ADC error	- Re-energize indicator - Call FLINTEC
Err 2	ADC error	- Re-energize indicator - Call FLINTEC
Err 3	Indicator cannot be calibrated	- Check load cell cable and load then start calibration again
Err 10	EEPROM error	- Configure the instrument - EEPROM broken
Err 20	Calibration error	- Calibrate the indicator.
Err 21	Configuration error	- Configure the indicator.
Err 22	Tare, CN, Total weight and the SP in use error	- Check SP, PT and ID entries. - Check Tare, CN and Total weight
Err 26	Set point error	- Reload Set points.
Err 27	Indicator is not calibrated	- Calibrate the indicator
Err 30	Processor Error	- Call FLINTEC
Err 34	Indicator cannot be calibrating	- Load cell signal is negative, very low or too high
Err 35	Calibration Error	- Calibration loading is not enough. - Check test weight loading.
Err 36	Calibration load value entry Error	- Test weight is too small. Increase the test weight.
Err 37	Scale unstable	- Wait until scale become stable. - Check grounding wiring.
Err 47	Main pcb info error	- Call FLINTEC
Err 61	EEprom error	- Call FLINTEC
Err 70	Modbus selection error	- Check data format of other interfaces. - Other interfaces should not be Modbus.
E XXXX	Hardware error	- Call FLINTEC

Display messages

E E E	Indicates if the weight is not in zero range	Refer to parameter [202], page 39
Pllr2Er	Indicates during zeroing, after power-on	Refer to parameter [202], page 39

18 PARAMETER-DEFAULT TABLE

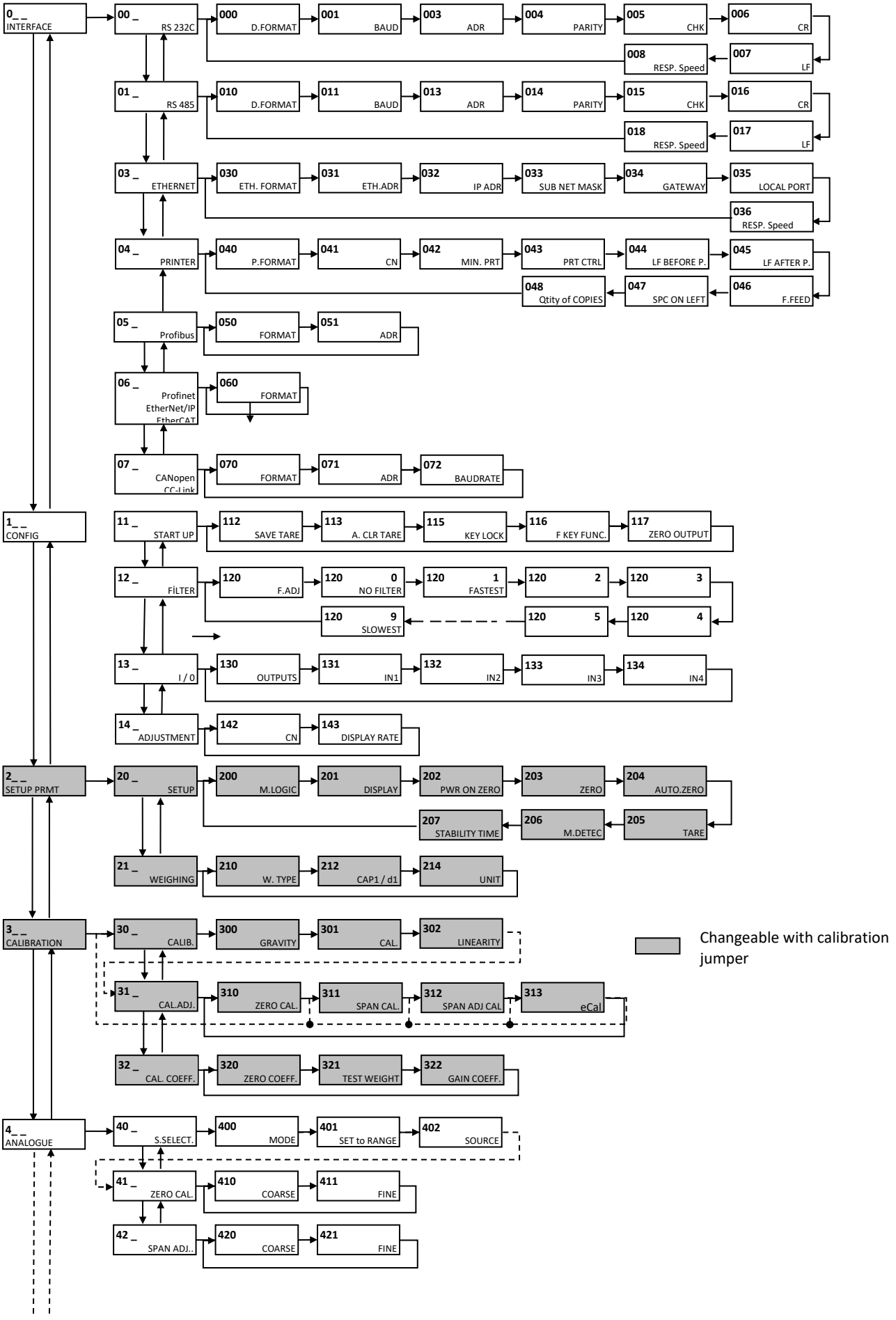
0--	**Interface Block**	
00-	**RS 232C**	
000	Data Format	3 = BSI
001	Baud rate	3 = 9600
003	Address	0
004	Data length and Parity	0 = 8 bit, no parity
005	Checksum	0 = Disable
006	Carriage Return	1 = Enable
007	Line Feed	1 = Enable
008	Response Speed	0 = immediately
01-	**RS 485**	
010	Data Format	5 = Modbus RTU Lo-Hi
011	Baud rate	3 = 9600
013	Address	1
014	Data length and Parity	0 = 8 bit, no parity
015	Checksum	0 = Disable
016	Carriage Return	1 = Enable
017	Line Feed	1 = Enable
018	Response Speed	0 = immediately
03-	**Ethernet**	
030	Ethernet Data Format	0 = No
031	Ethernet Address	1
032	IP Address	192.168.016.250
033	Gateway Address	192.168.016.253
034	Subnet Mask	255.255.255.000
035	Local Port	502
036	Response Speed	0 = immediately
04-	**Printer**	
040	Print out format	2 = Multi line
041	CN	1 = Will be printed
042	Minimum print	20
043	Print method	0 = With Print Key
044	Line feed before printing	00 = 0 F + 0 LF
045	Line feed after printing	04 = 0 F + 2 LF
046	Form feed	0 = Disable
047	Space on the left	3
048	Quantity of copies	1
05-	**Profibus DP**	
050	Data Format	0 = signed 32 bit
051	Rack Address	0
06-	**Profinet, EtheNet/IP, EtherCAT**	
060	Data Format	0 = signed 32 bit
07-	**CANopen, CC-Link**	
070	Data Format	0 = signed 32 bit
071	Rack Address	0
072	Baudrate	0= 156 kbps
1--	**Configuration Block**	
11-	**Start Up**	
112	Tare memory	1 = Enable

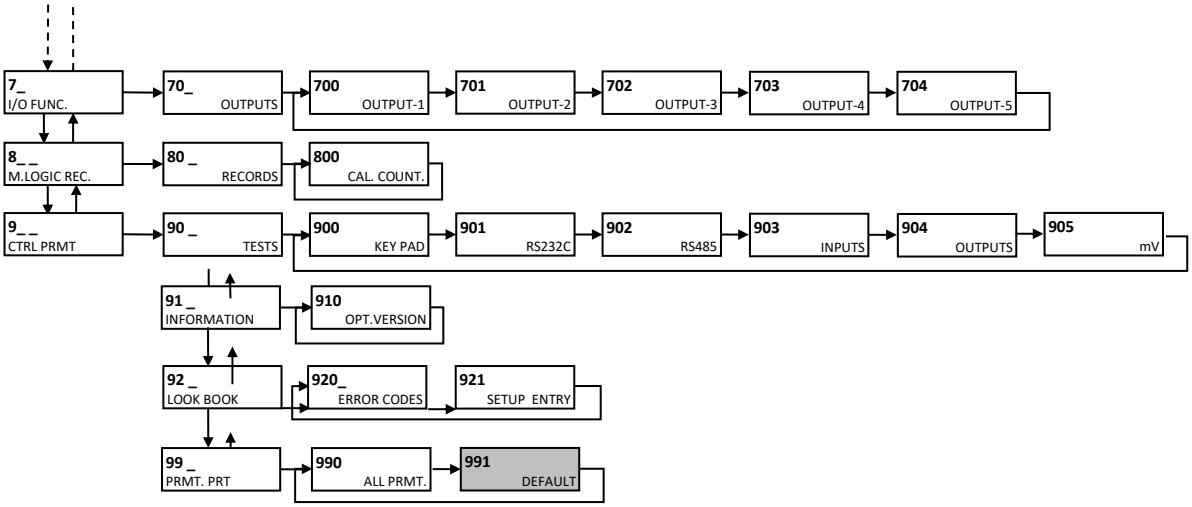
14-	**Entries**	
142	Label No entrance	
143	Display Refresh Rate	1 = 100ms
2--	**Scale Block**	
20-	**Set up**	
200	Approved	0 = No
201	Increased indication	0 = x10 key
202	Power on zero	0 = Disable
203	Zero range	3 = ± %50
204	Auto zero tracking	0 = Disable
205	Tare	2 = Tare/Clear
206	Motion detector	2 = ± 1e
207	Stability Period	0.3
21-	**Scale Build**	
210	Scale Type	0 = Single Range
212	Capacity / d	6000 kg / 1 kg
214	Unit	1 = kg
3--	**Calibration Block**	
30-	**Calibration**	
300	Gravity	
301	Calibration	
302	Linearity Correction	
31-	**Adjustment**	
310	Zero adjustment	
311	Span adjustment	
312	Span adjustment under load	
313	eCal Calibration	
4--	**Analogue Output Block**	
40-	**Signal Selection**	
400	Analogue Output Mode	0 = 4-20mA
401	Set Analogue output to calib. range	
402	Source of the analogue output	0 = Gross
41-	**Zero Adjustment**	
410	Coarse Zero Adjustment	
411	Fine Zero Adjustment	
42-	**Span Adjustment**	
420	Coarse Span Adjustment	
421	Fine Span Adjustment	
70-	**Digital Output Functions**	
700	Output 1	0 = No
701	Output 2	0 = No
702	Output 3	0 = No
703	Output 4	0 = No
704	Output 5	0 = No
8--	**Metrological Data Block**	
80-	**Legal Metrology**	
800	Calibration counter	
9--	**Diagnostic**	
90-	**Tests**	

113	Auto tare clear	0 = Not used
115	Key lock	11111
116	Function key	1 = x10
117	Zero range output	0 = Gross zero
12-	**Filter**	
120	Filter	7
13-	**Parallel I / 0**	
130	Outputs	0
131	Input 1	0
132	Input 2	0
133	Input 3	0
134	Input 4	0
137	Output polarity (FT-10, FT-10P)	1
138	I/O- 1 (FT-10, FT-10P)	000000
139	I/O– 2(FT-10, FT-10P)	000000

900	Key Pad testing	
901	RS 232C testing	
902	RS 485 testing	
903	Parallel inputs test	
904	Parallel outputs test	
905	mV indication	
99-	**Printing Parameters**	
990	Whole parameters	
991	Load default parameters	

19 SETTINGS AND CALIBRATION MENU




7_
I/O FUNC.
70_
OUTPUTS
700
OUTPUT-1
701
OUTPUT-2
702
OUTPUT-3
703
OUTPUT-4
704
OUTPUT-5
8_ _
M.LOGIC REC.
80 _
RECORDS
800
CAL. COUNT.
9_ _
CTRL PRMT
90 _
TESTS
900
KEY PAD
901
RS232C
902
RS485
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INPUTS
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905
mV
91 _
INFORMATION
910
OPT.VERSION
92 _
LOOK BOOK
920_
ERROR CODES
921
SETUP ENTRY
99 _
PRMT. PRT
990
ALL PRMT.
991
DEFAULT

20 CALIBRATION TABLE

n = Max Capacity / e recommended values are given in the table below. You can use this table to select your Max and e values. Max value can be entered freely.

SCALE INTERVAL (e) \ NUMBER OF SCALE INTERVAL (n)	1000	2000	2400	2500	3000	4000	5000	6000	8000	10000	12000	15000	16000	20000	25000	30000	40000	50000	60000
0,001	1	2			3	4	5	6	8	10	12	15	16	20	25	30	40	50	60
0,002	2	4		5	6	8	10	12	16	20	24	30	32	40	50	60	80	100	120
0,005	5	10	12		15	20	25	30	40	50	60	75	80	100	125	150	200	250	300
0,01	10	20	24	25	30	40	50	60	80	100	120	150	160	200	250	300	400	500	600
0,02	20	40	48	50	60	80	100	120	160	200	240	300	320	400	500	600	800	1.000	1.200
0,05	50	100	120	125	150	200	250	300	400	500	600	750	800	1.000	1.250	1.500	2.000	2.500	3.000
0,1	100	200	240	250	300	400	500	600	800	1.000	1.200	1.500	1.600	2.000	2.500	3.000	4.000	5.000	6.000
0,2	200	400	480	500	600	800	1.000	1.200	1.600	2.000	2.400	3.000	3.200	4.000	5.000	6.000	8.000	10.000	12.000
0,5	500	1.000	1.200	1.250	1.500	2.000	2.500	3.000	4.000	5.000	6.000	7.500	8.000	10.000	12.500	15.000	20.000	25.000	30.000
1	1.000	2.000	2.400	2.500	3.000	4.000	5.000	6.000	8.000	10.000	12.000	15.000	16.000	20.000	25.000	30.000	40.000	50.000	60.000
2	2.000	4.000	4.800	5.000	6.000	8.000	10.000	12.000	16.000	20.000	24.000	30.000	32.000	40.000	50.000	60.000	80.000	100.000	120.000
5	5.000	10.000	12.000	12.500	15.000	20.000	25.000	30.000	40.000	50.000	60.000	75.000	80.000	100.000	125.000	150.000	200.000	250.000	300.000
10	10.000	20.000	24.000	25.000	30.000	40.000	50.000	60.000	80.000	100.000	120.000	150.000	160.000	200.000	250.000	300.000	400.000	500.000	600.000
20	20.000	40.000	48.000	50.000	60.000	80.000	100.000	120.000	160.000	200.000	240.000	300.000	320.000	400.000	500.000	600.000	800.000		
50	50.000	80.000 100.000	120.000	125.000	150.000	200.000	250.000	300.000	400.000	500.000	600.000	750.000	800.000						
100	100.000	200.000	240.000	250.000	300.000	400.000	500.000	600.000	800.000										
200	200.000	400.000	480.000	500.000	600.000	800.000													

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