FT-10 Flow

Discontinuous Totalizer

Technical Manual

Flintec GmbH
Bemannsbruch 9
74909 Meckesheim
GERMANY
www.flintec.com

Table Of Contents

RIGHTS AND LIABILITIES

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 ENGINEERING 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 ANY CONNECTION, OPENING THE ENCLOSURE 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. DECLARATION OF CONFORMITY

EU-Konformitätserklärung
EU-Declaration of Conformity

Monat/Jahr: *month/year:* 04/2016

Hersteller: *Manufacturer:* Flintec GmbH

Anschrift: *Address:*
Bemannsbruch 9
D-74909 Meckesheim
Deutschland

Produktbezeichnung: *Product name:*
FT-10 Fill and FT-10 Flow
(Wäge Indikator / *Weighing Indicator)*:

Nr. der Bauartzulassung:
No oft the EC type-examination certificate:
Nichtselbsttätige Waage (NSW)
Non-automatic Weighing Instrument (NAWI)

FT-10 Fill and FT-10 Flow
DK 0199.492, Delta

Nr. der Bauartzulassung:
No oft the EC type-examination certificate:
Selbsttätige Waage zum Totalisieren
Discontinuous Totalizing automatic weighing instrument

FT-10 Fill   : DK 0199.514, Delta
FT-10 Flow: DK 0199.515, Delta

entspricht dem in der Bescheinigung über die Bauartzulassung beschriebenen Baumuster sowie den Anforderungen in der jeweils geltenden Fassung folgender Richtlinien:
corresponds to the production model described in the EC type approval certificate and to the requirements of the current version of the following EC directives:

2014/30/EU	*2014/30/EC*
2014/35/EU	*2014/35/EC*
2004/22/EU	*2004/22/EC*
2014/31/EU	*2014/31/EU*

entsprechend den folgenden Normen:
in conformity with the following standards:

EN 45501:2015   OIML R61   EN 61326-1:2013   EN 62368-1

Die Absicherung aller produktspezifischen Qualitätsmerkmale erfolgt auf Basis eines zertifizierten Qualitätsmanagement-Systems nach DIN ISO 9001.
All product-related features are assured by a quality system in accordance with ISO 9001.

Diese Erklärung gilt nur in Verbindung mit einer Konformitätsbescheinigung einer benannten Stelle.
This declaration is only valid with a certificate of conformity by a notified body.

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherung von Eigenschaften.
This declaration certifies the conformity with the listed directives, but it is no promise of characteristics.

Dr. Jens Achenbach
Geschäftsführer / *Managing Director*

ppa. Felix von Hertling
Technischer Leiter / *Technical Director*

3. INTRODUCTION

3.1 Overview

FT-10 FLOW discontinuous totalizer is used for flow control in the production line together with totalizing the transferred material. This instrument also gives information for estimated next 24h total, for the actual flow rate and daily total. Additionally 3 accumulations can be used for different purposes like production batch total, turn total, weekly total etc. This controller has 4 opto-isolated digital input, 2 non-isolated digital input and 5 relay contact outputs.

3.2 Key features

	FT-10FLOW	FT-10FLOW PB	FT-10FLOW PN	FT-10FLOW EN	FT-10FLOW CO	FT-10FLOW EI	FT-10FLOW EC	FT-10FLOW CC
1 000 to 999 999 display resolution	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
Up to 1600 conversion per second	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Serial interface RS 232C	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Serial interface RS 485	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Modbus RTU	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Modbus TCP	-	-	-	Yes	-	-	-	-
Profibus DPV1 interface	-	Yes	-	-	-	-	-	-
Profinet interface	-	-	Yes	-	-	-	-	-
Ethernet interface	-	-	-	Yes	-	-	-	-
CANopen interface	-	-	-	-	Yes	-	-	-
Ethernet IP interface	-	-	-	-	-	Yes	-	-
EtherCAT interface	-	-	-	-	-	-	Yes	-
CC-Link interface	-	-	-	-	-	-	-	Yes
Continuous data output	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fast Continuous data output	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
BSI data interface	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4 digital input and 5 relay contact output	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2 non- isolated inputs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Auto-zero tracking	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Motion detection	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zeroing and Taring by field bus command	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adaptive digital filter for fast and stable reading	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Electronic calibration (eCal) without test weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Electronic calibration (eCal) over field bus	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zero and Span calibrations over field bus	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zero adjustment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Span adjustment with test weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Span adjustment for filled tanks	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3 point calibration (linearity correction)	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
12 to 28 VDC power supply range	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

3.3 Specifications:

Common Specifications		
A/D Converter:		
A/D converter type:		24 bit Delta-Sigma ratiometric 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 (Non approved)
Analog input range:		-18 mV … +18 mV
Internal resolution:		up to 16 000 000
External Resolution:		
Display resolution		up to 10000 increments (approved); up to 999 999 increments (non approved)
Scale Calibration and Functions:		
Calibration:		Calibration is performed with or without test weights (eCal)
Digital filter:		10 steps programmable adaptive filter
Weighing functions:		Zeroing, auto zero tracking, motion detection, increased resolution.
Application functions:		Flow rate control, accumulation control, By-pass function, control of emptying pipe, ton/hour, 4 pcs accumulation, estimated 24h total indications,
Linearity:		
		Within 0.0015% FS, $\leq$ 2 ppm/°C
Load cells:		
Excitation:		5 VDC max. 300 mA
Number of load cells:		Up to 8 load cells 350 Ω or 25 load cells 1100 Ω in parallel
Connection:		4- or 6-wire technique. Cable length: maximum 1000 m/mm² for 6-wire connection
Communication:		
Data Formats		Continuous, Fast Continuous, Printer formats, BSI Protocol, Modbus RTU
RS-232C	Baudrate	1200 to 115200 baudrate, 8N1 / 7O1 / 7E1 / 8O1 / 8E1
	Response speed:	Up to 4 ms response delay after read/write commands
RS 485	Baudrate	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
Digital Inputs and Outputs:		
Digital Inputs		4 opto-isolated and 2 non-isolated digital inputs; 12 … 28 VDC, 10mA
Digital Outputs		5 free relay contact 250 VAC or 30 VDC , 1A
Non-isolated inputs		2 non- isolated inputs for By-Pass and empting pipe control
DC Power supply:		
		12 to 28 VDC max. 300 mA
Environment and Enclosure:		
Operation temp.:		-10°C to +40°C; 85% RH max, non-condensing (approved) -15°C to +55°C; (non approved)
Enclosure		Panel type, front panel and rear panel are stainless steel; Aluminum body.
Protection		Front panel IP65

FT-10 FLOW PB   Profibus DPV1

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 FLOW PN   Profinet

Communication:	
Data rate:	100 Mbit/s, full duplex
GSDML file:	Generic GSDML-file provided
TCP/IP settings:	DHCP or manual IP assign over EtherX 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.
Isolation:	Galvanically isolated bus electronics
Response speed:	Up to 4 ms response delay after read/write commands

FT-10 FLOW EN   Ethernet

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

FT-10 FLOW CO   CANopen

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 meter.
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	
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 EtherX 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
Web client	Available

FT-10 EC EtherCAT	
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	
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
Data rate	156 kbit/s – 10 Mbit/s (selectable)

3.4 The Front View and Key Functions
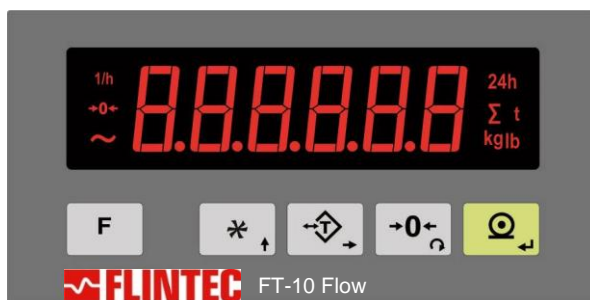
Figure 3.1 - Front panel view of FT-10 FLOW

3.4.1 Display

The weight display of FT-10 FLOW is 14mm high and consists of 6 digits LEDs. Annunciators as shown in the table below are located at the left and right side of the weight display.

The meanings of the announcement LEDs on the display are:

1/h	Announces the flow rate together with the unit on the right of the display. For example: if this symbol appears together with t unit, the displayed flow rate unit is t/h.
→0←	Announces the weight is in the center of zero.
~	Announces the weight value on the display is unstable.
24h	Announces the calculated next 24h material transfer for the actual flow rate.
Σ	Accumulated total material weight.
Unit	Kilogram (kg), libre (lb) and ton (t) units are located on the right of the display.

3.4.2 Key Pad

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

F	**Function:** Flow rate, Estimated daily total and total values are displayed sequentially by pressing this key, Parameter [116] (Page 32).
✳	**Target / Coarse / Fine Menu:** Press this key for entering target (nominal filling value), Coarse lead in and fine lead in values (Page 43). **Application Related Parameters:** To enter the process parameter menu, long press this key. Refer to related mode.
→◇→	**Tare / Clear:** Press this key to tare the scale and get into the Net mode in weighing mode.
→0←	**Zeroing:** In Gross mode and Ready state, if the scale doesn't show zero while there is no load on the hopper, you can zero the scale by pressing this key.
◉	**Print:** By pressing this key weight data and other information depending on the setup parameters will be sent to a printer or a PC via serial port in basic weighing mode.

3.4.3 Key Lock

FT-10 Flow has ability to lock the keys to avoid unauthorized person's interfere.

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

3.4.4 Housing

FT-10 FLOW housings are panel type with stainless steel front and back parts and aluminum body.
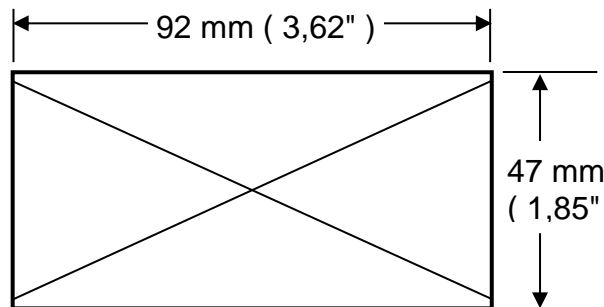
The hole dimensions for mounting FT-10 FLOW on the panel
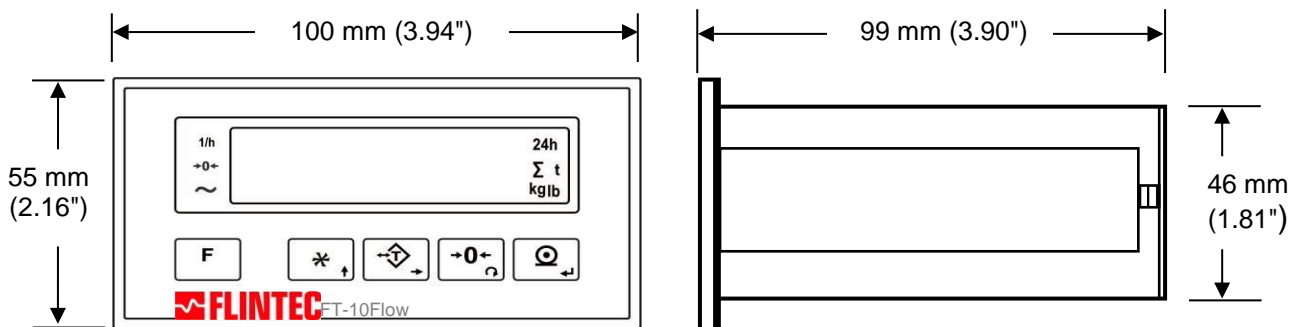
FT-10 FLOW front and side view
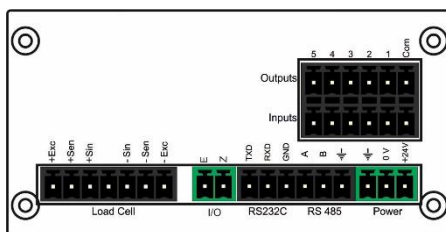
FT-10 FLOW Panel type rear view
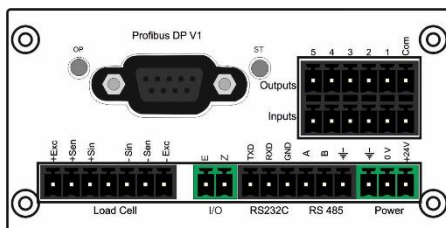
FT-10 FLOW PB Panel type rear view
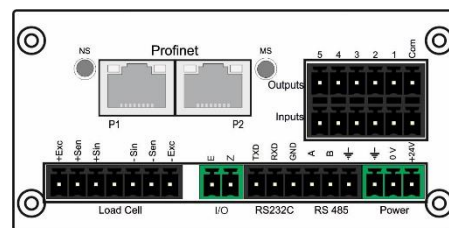
FT-10 FLOW PN Panel type rear view
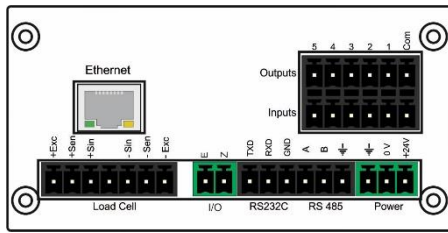
FT-10 FLOW EN Panel type rear view
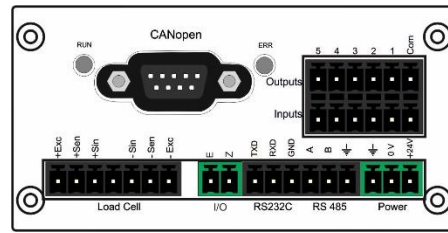
FT-10 FLOW CO Panel type rear view
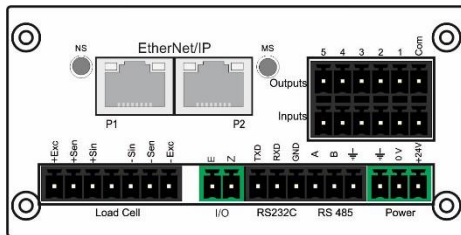
FT-10 FLOW EI rear view
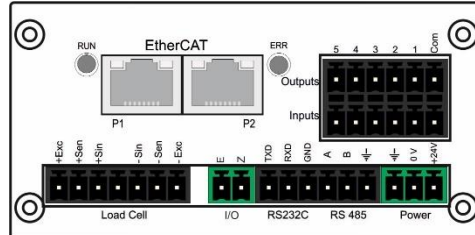
FT-10 FLOW EC rear view
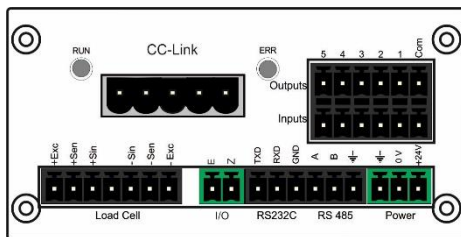
FT-10 FLOW CC type rear view

4. 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.*

4.1 Recommendations

4.1.1 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°C and +40°C (-15 ⁰C and +55 ⁰C non approved), humidity not exceeding 85% non-condensing. All external cables should be installed safely to avoid mechanical damages.

FT-10 FLOW instruments are very low level signal measuring instruments. To avoid electrical noise, FT-10 FLOW should be separated from equipments that produce 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 equipments such as heavy load switches, motor control equipments, inductive loads etc., please be careful against the EMC interference in the cabinet. If possible protect FT-10 FLOW instruments with the faraday cage or install them in separate section or install them far away from this kind of equipments. Connect parallel reverse diodes to the DC inductive loads like relays, solenoids etc. to minimize voltage peaks on the DC power lines.

4.1.2 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.

4.2 Mechanical Installation

Take care to the housing dimensions and the suggested panel hole dimensions given in the Page 12. To avoid electrical noises, protect your controller which has very low input signal level from the equipment that produces electrical noise in panel mounting.

4.3 Electrical Connections

Warning: *Please always remember that FT-10 FLOW instruments are very low voltage measuring instruments. Your control cabinet design and proper installation increases 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 instruments grounding will provide weighing accuracy and the safety of your controller. 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 controller, turn the power off and wait at least 30 seconds before interfering.

4.3.1 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.

PE Protective grounding

Loadcell cable shield

The pin layout of the 24VDC connector of FT-10 FLOW Series (rear view)

0V 24V
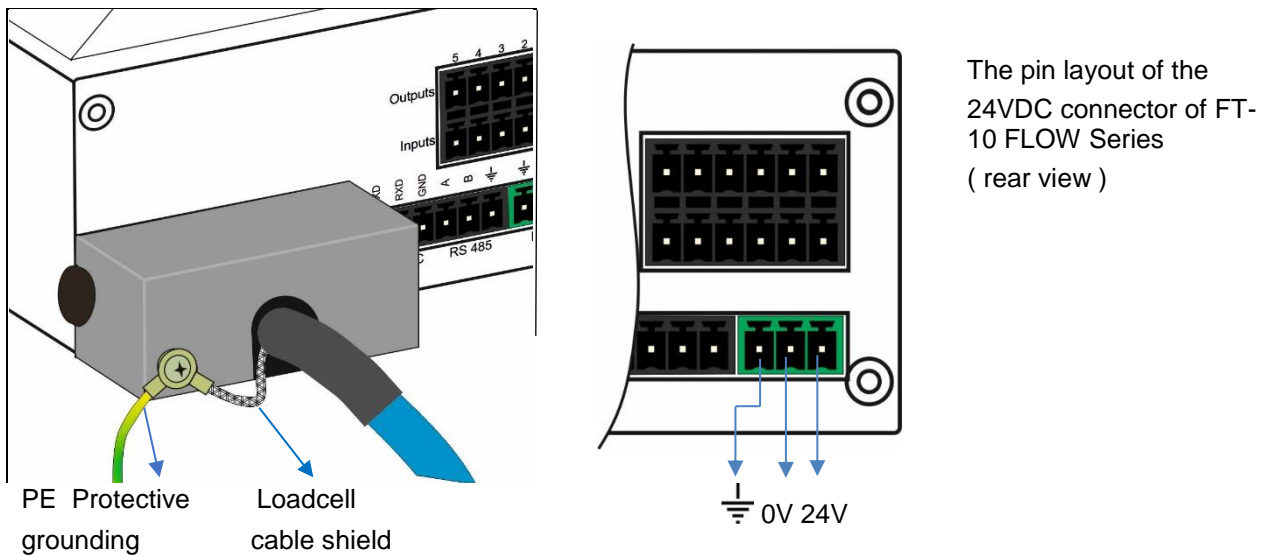
Figure 4.1 - The pin layout of 24VDC connector

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.

4.3.2 Load Cell Connection

To avoid damages, the load cell wiring should be made carefully before energizing the instrument. Load cell connection details are 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 FLOW and the junction box and short circuit these pins at junction box for better performance.

4 wire LC connection

+Exc
+Sen
+Sig

-Sig
-Sen
-Exc

6 wire LC connection

+Exc
+Sen
+Sig

-Sig
-Sen
-Exc
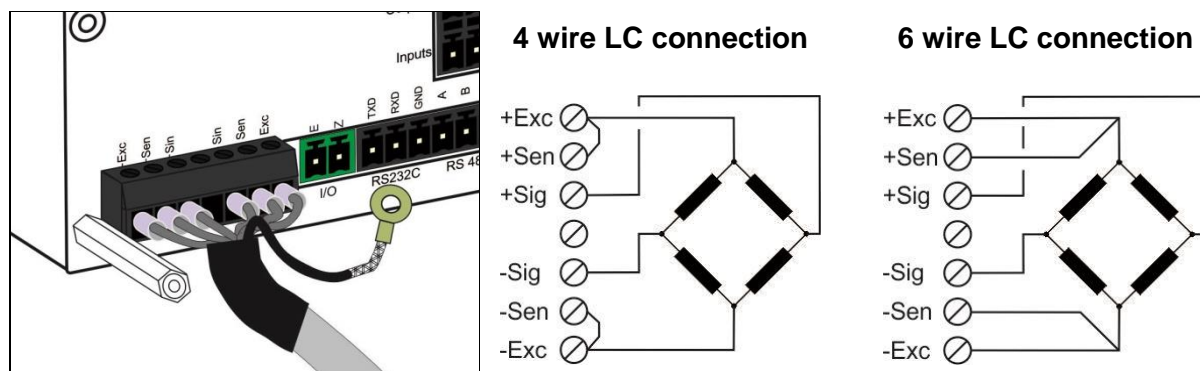
Figure 4.2 - Load cell connections

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.

4.3.3 RS 232C Connection

RS 232C port usage and specifications are shown in the table below (*Page 27*).

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 in Figure 4.3.

Figure 4.3 - RS 232C serial interface connections

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

4.3.4 RS 485 and Modbus-RTU Connection

RS 485 port usage and specifications are shown in the table below *(*Page 28*).*

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 below in Figure 3.1. Line termination resistors (110 ohm) are needed on both ends of the RS 485 line.
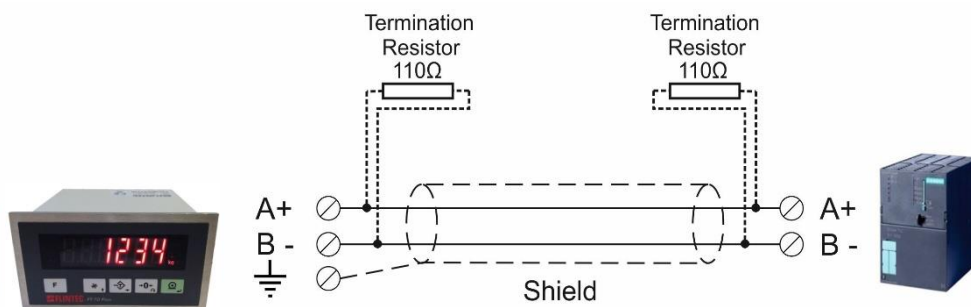
Figure 4.4 - RS485 serial interface connections

4.3.5 Profibus Connection (only FT-10 FLOW PB)

Profibus connection is done as indicated below in Figure 4.5.

PROFIBUS

Figure 4.5 - FT-10 FLOW 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

4.3.6 Profinet Connection (only FT-10 FLOW PN)

Profinet connection is done as indicated below in Figure 4.6.

PROFINET

Figure 4.6 - FT-10 FLOW 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 done as direct connection as shown below:

Figure 4.7 - HUB connection

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

Figure 4.8 - 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 Profinet interfacing.*

4.3.7 Ethernet Connection (only FT-10 FLOW 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) is ;

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 done as direct connection as shown below:

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 FLOW 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 Ethernet interfacing.*

4.3.8 CANopen Connection (only FT-10 FLOW CO)

CANopen connection is done with four wires as indicated below in Figure 4.11. The data line ends must be equipped with 120 ohm bus terminating resistors.
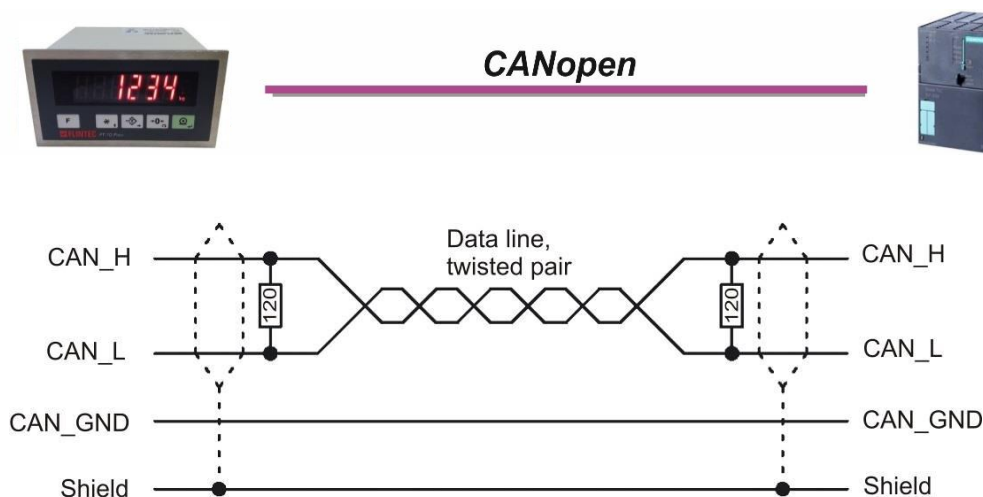
Figure 4.11 - FT-10 FLOW CO serial interface connections

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	-

Table 4.3 - FT-10 FLOW CO serial interface connector

Warning: *Connect the shield to the reference ground.*

Warning: *Disconnect IndFace1X PC software before starting CANopen interfacing.*

4.3.9 EtherNet/IP Connection (only FT-10 FLOW EI)

EtherNet/IP connection is done as indicated below in Figure 4.12.

Figure 4.126 – 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

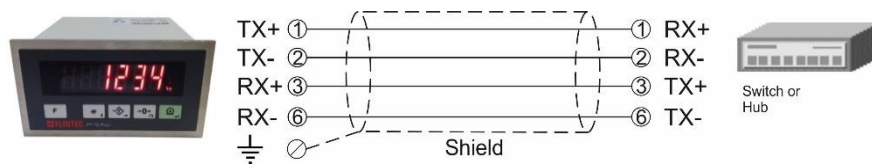The HUB connection cabling will be a direct connection as shown below:

Figure 4.13 - HUB connection

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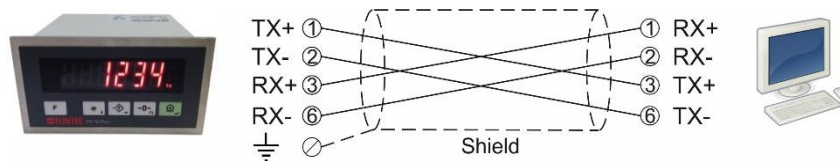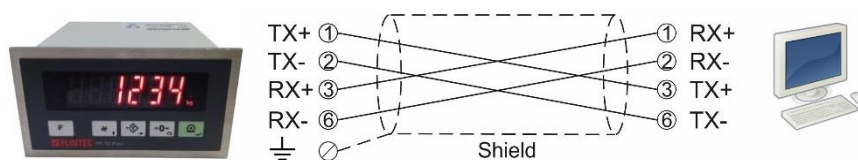

Figure 4.14 - Cross PC connection

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.

4.3.10   EtherCAT Connection (only FT-10 FLOW EC)

EtherCAT connection is done as indicated below in **Figure 4.15**.

Figure 4.15 – FT-10FLOW EC 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

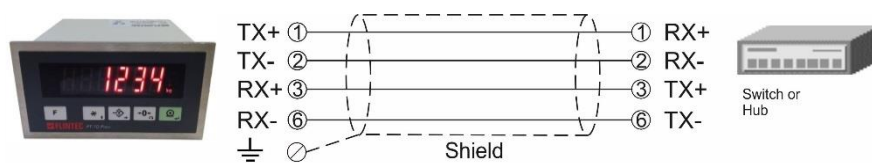The HUB connection cabling will be a direct connection as shown below:

Figure 4.16 - 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.
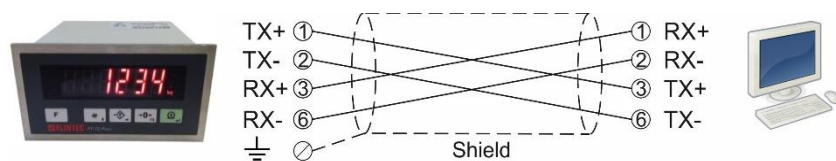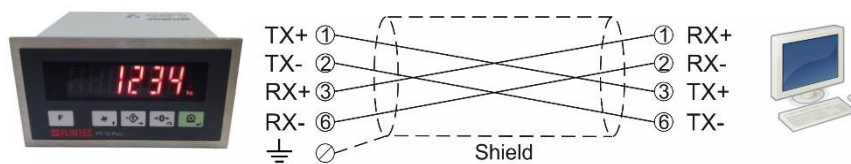

Figure 4.17 - Cross PC connection

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

4.3.11 CC-Link Connection (only FT-10FLOW CC)

CC-Link connection is done as indicated below in **Figure 4.18**.

Figure 4.18 – FT-10FLOW CC 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
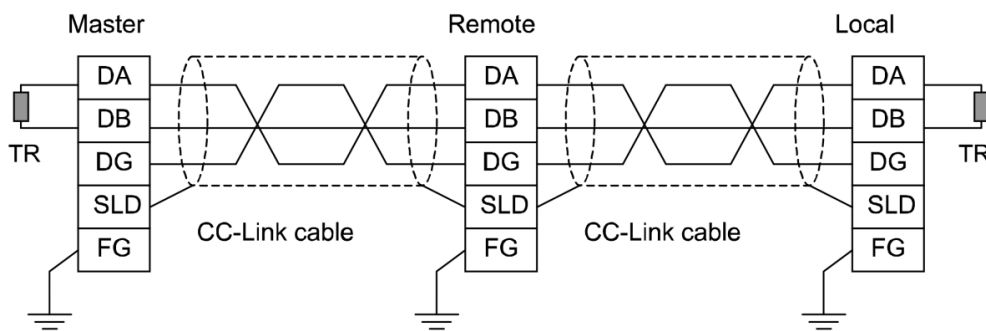
Warning: Connect the shield to the reference ground or shield pin of the power connector.
Warning: Disconnect IndFace1X PC software before starting CC-Link interfacing.

4.3.12   Digital Inputs and Outputs Connection

Inputs connection diagrams are shown in
Figure 4.19 and in Figure 4.20.
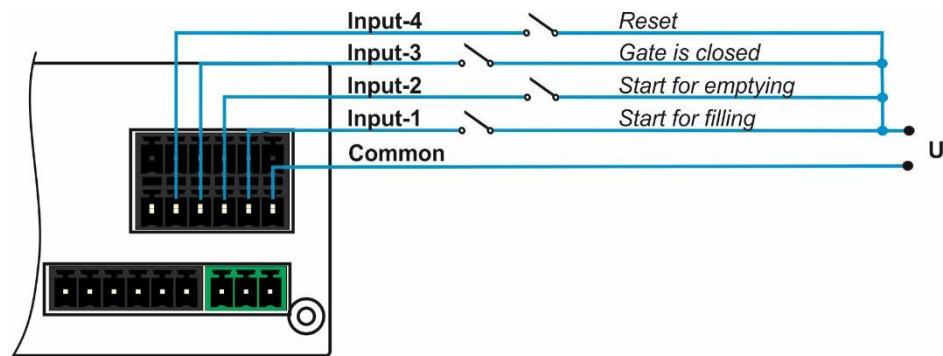
Figure 4.19 – Isolated inputs connection
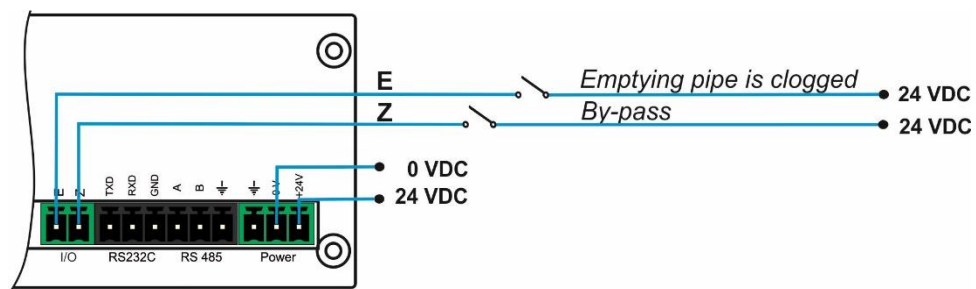
Figure 4.20 – Non-isolated inputs connection

Outputs connection diagram is shown in Figure 4.21.
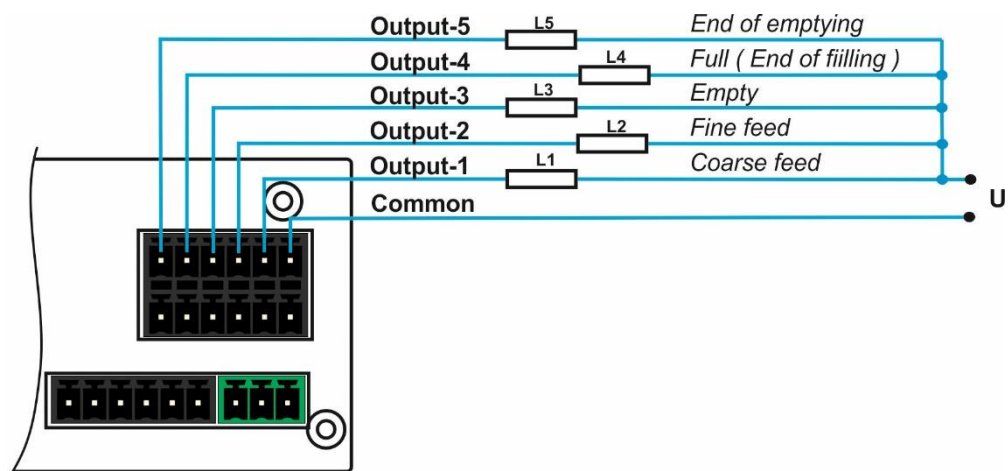
Figure 4.21 - Outputs connection

4.4 Commissioning

PRECAUTION: *Please read this manual carefully before energizing the instrument. Perform the commissioning operation according 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.*

After finishing the required installations and connections of FT-10 FLOW, turn the power on and make calibration. After checking the performance of your weighing instrument you can begin to use the controller. Power off the controller for other peripheral connections.

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

To start up the filling system, please follow as:

1. Connect parallel I/O connector prepared according as described in the filling modes section.
2. Enter Calibration parameters in parameter groups [**21-**] and [**3--**].
3. Enter Programming parameters in parameter group [**5--**].
4. Enter the application related parameters as explained in operation.
5. Enter Target and preset values as explained on Page 25*.*

You can find the process operation, display messages, descriptions of the parameters and a connection diagram example, in section 6.

5. PROGRAMMING AND CALIBRATION

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

F	*	↔Ṯ	→0←	☺
Exit without saving	Advancing next parameter	Select the digit will be changed	Changing parameter value or increasing the blanking digit	Enter

5.1 Entering the Programming and Calibration

On the rear side of FT-10 Flow there is a calibration DIP switch. Its position should be "ON" (downward) to be able to change the metrological related parameters and the calibration.

For approved applications change the DIP switch to "OFF" position.
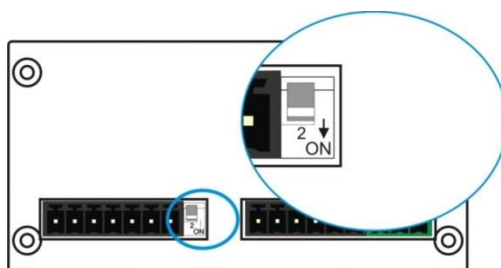
Figure 5.1 - The location of calibration DIP switch

Display	Operation
[123.456 kg]	Press [F] key until [**PASSWr**] prompt appears.
[PASSWr]	Press [*] + [→0←] + [*] keys sequentially.
[---]	Press [☺] key for confirm.
[**0--**]	First block of Programming menu.

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

5.2 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**] prompt appears.
[PASSWr]	Press [→0←] + [→0←] + [→0←] keys sequentially.
[**---**]	Press [☺] key for confirm.
[**310**]	Zero Adjustment parameter.
"Calibration"	Press [☺] key to start zero adjustment. Or press [*] key to access span calibration without zero adjustment.

5.3 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. [**Waıt**] message will be shown on the display for a little while, and automatically get back to weighing mode.

Especially for legal metrological usage, please don't forget to turn the power off and "OFF" position the calibration DIP switch to start operation.

5.4 Programming [0--]

5.4.1 Serial Port, Printer and Fieldbuses

[0--] Interface Block

In this section the parameters of serial interface of FT-10 FLOW indicator can be set up. The data output modes can be used only once except continuous data output.

[00-] RS 232C Serial Port

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

[000 3] Data Format

0 : No data transfer.
1 : Continuous data output (*)   (Page 45)
2 : Print mode   (Parameter [**040**] (Page 30)
3 : BSI command set   (Page 47)
4 : Modbus RTU High-Low   (Page 52)
5 : Modbus RTU Low-High   (Page 52)
6 : Fast continuous mode   (Page 46)

*(*)* **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, controller will operate without any 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

[007 1] Line feed

You can enable or disable for continuous data format.

0 : No LF   1 : LF enables

[008 0] Response Speed

0 : Modbus RTU Answer is sent immediately after Request is received.
1 : Modbus RTU Answer is delayed 20 msec 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 FLOW.

[010 5] Data Format

0 : No data transfer.
1 : Continuous data output $^{(*)}$ (Page 45)
2 : Print mode   (Parameter [**040**]   (Page 30)
3 : BSI command set   (Page 47)
4 : Modbus RTU High-Low   (Page 52)
5 : Modbus RTU Low-High   (Page 52)
6 : Fast continuous mode   (Page 46)

*(*)* **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, controller will operate without any 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 msec after Request is received.
This property is very helpful for slow PLC systems

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

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

[030   5] Data Format

0 : No data transfer.
1 : Continuous data output   (Page 45)
2 : Print mode   (Parameter [**040**]   (Page 30)
3 : BSI command set   (Page 47)
4 : Modbus TCP High-Low ⁽*⁾   (Page 70)
5 : Modbus TCP Low-High ⁽*⁾   (Page 70)
6 : Fast continuous mode   (Page 46)

(*) **Warning :** *Parameter [**000**] and [**010**] should not be selected Modbus RTU.*

[031 001] Device Address

The address of FT-10 FLOW will be entered between 000 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 46)
2 : Multi line-24   (Page 46)
3 : Multi line-16   (Page 46)

[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 become stable. The weight value should decrease under selected 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.*

[049 0] Date/Time
0 : No Date/Time .
1 : Date/Time in DD/MM/YY format.
2 : Date/Time in MM/DD/YY format.
3 : Date/Time in YY/MM/DD format.

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

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

[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 FLOW will be entered via keypad between 001 to 126.

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

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

[060   0] Data Format

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

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

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

[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 FLOW 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	

5.4.2 Configuration Block [1--]

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

[11-] Start Up

[116 0] Total Indication

The parameter defines total indication at basic weighing mode by pressing < [F] > key.

0 : Total-1 (Erasable total).
1 : Total-2 (The current day's total).
2 : Total-3 (Non-erasable total).

Explanation: *If this parameter is selected as Total-1, to clear that weight, you need to press < [→0←] > key while the Total-1 value and [**Clear**] will appear on the display. You can confirm deletion by pressing*

< [Ø] > *key or cancel by pressing < [F] > key.*

Note: *Total-2 (The current day's total) value is transferred to Total-4 (yesterday's total) when the time is 00:00 o'clock after Total-2 value is cleared automatically by FT-10 FLOW. Total-4 (yesterday's total) can be reached only over fieldbus.*

[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-10 Flow series is the possibility to view 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 0 to 9 (The minimum value of the filter at least 7 in normal weighing applications). If you enter this parameter and press < [Ø] > key while [**120   X**] appears on the display, the weight variation will be shown 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 < [F] > key.

[14-] Entries

In this block you can enter the date, time and initial CN values.

[140   ] Date [DD.MM.YY]

First press < [→⬦←] > key for date entrance, then enter the new date via < [→⬦←] > and < [→0←] > keys and saved by pressing < [Ø] > key.

[141   ] Time [HH.MM]

First press < [→⬦←] > key for time entrance, then enter the new time via < [→⬦←] > and < [→0←] > keys and saved by pressing < [Ø] > key.

[142   ] Label No (CN) [XXXXXX]

The desired value is entered via < [→⬦←] > and < [→0←] > keys and saved by pressing < [Ø] > 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

5.4.3 Scale Block [2--]

[20-] Set Up

In this block the parameters for weighing operation can be entered.

[200   0]   Approved

0   : No.   Units of total target ([t-trGt]) and total are displayed 1000 times of the scale division in metric units. OIML's restrictions are not considered.

1   : OIML.   Units of total target ([t-trGt]) and total are displayed in scale division accuracy. All parameter values are restricted for OIML.

2   : No.   Units of total target ([t-trGt]) and total are displayed at scale division accuracy. OIML's restrictions are not considered.

[201   0]   Increased Indication

0 : by pressing key   1 : Always increased indication

[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

[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 : Disable

[21-] Scale Build

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

[212   ] Capacity

Press [icon] key to enter this parameter.

[CAP] [XXXXXX]

Enter the capacity of the scale via [icon] and [icon] keys and confirm the value with [icon] key.

[d   ] [XXXXXX]

Display resolution will be selected by [icon] key and confirmed with [icon] key.

[214 1]   Unit

0   : kg   (Kilogram)

1   : lb   (Libre)

5.5 Calibration Block [3--]

The calibration of the scale will be performed here.

[30-] Calibration

[301   ] Calibration

Calibration involves emptying the scale then placing a known test weight on an empty scale and allowing the FT-10 FLOW controller 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 scale, then press < >.

3. The terminal automatically starts to capture zero and the [**WAıt**] message indicates the operation is in progress.

4. After appearing the [**Load**] prompt, the test weight value should be entered for the calibration 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 10 seconds while span calibration is being performed.

7. At the [**SAvE**] prompt press < > key to continue to the next parameter or press < > key to exit without saving the calibration.

[302   ] Linearity Correction

Because of the load cell non linearity or mechanical scale hardware, you may see non linearity on the scale performance. Three step scale calibration in this parameter improves the scale performance.

1. Press < > at the [**302**   ] prompt to start the calibration.

2. At the [**ZEro.CA**] prompt, remove any weight on the scale, 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 shown 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.

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 shown 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 scale 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. At the [**SAvE**] prompt press < > key to continue to the next parameter or press < > key to exit without saving the calibration.

[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 all weights from the scale, then press < ⊙ >.
3. The terminal automatically starts to capture zero and the [**WAıt**] message indicates the operation is in progress.
4. At the [**SAvE**] prompt press < ⊙ > key to continue to the next parameter or press

    < F > key to exit without saving the calibration.

[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 shown 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 seconds while span calibration is being performed.
5. At the [**SAvE**] prompt press < ⊙ > key to continue to the next parameter or press

    < F > key to exit without saving the calibration.

[312   ] Span Adjustment Under Load

This parameter is being used to perform span adjustment of a scale without lifting the load from it. This operation is 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. At the [**LoAd**] for a short while and then [**XXXXXX**] prompt, the test weight value will be used for the calibration shown 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 < ⇧ > and

    < →0← > 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. At the [**SAvE**] prompt press < ⊙ > key to continue to the next parameter or press

    < F > key to exit without saving the calibration.

[313] eCal Calibration

Warning: *The scale capacity and increment shall be entered before performing eCal with the parameter [212].*

This parameter lets you to perform calibration without using any test weights. FT-10 FLOW 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] > key to start eCal.

[LC.CAP] [XXXXXX]

Enter total load cell capacity via < [key] > and < [key] > keys and press < [key] > key to go to the next step.

Example: If the weighing system has 4 pcs 1000 kg load cells, enter 4000.

[LC.oUt] [XXXXXX]

Enter load cell output in mV/V via < [key] > and < [key] > 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] > 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 (look next step), press < [key] > key. After appearing of [**Zero.CA**] press < [key] > key for starting zero adjustment. The display will show [**WAıt**] message during zero adjustment. In this while the scale must be unloaded and stable. Approximately 10 seconds later the prompt [**SAvE**] will be displayed and you can save the calibration. If the scale is not empty or you prefer to enter estimated preload value, press the up < [key] > key.

[PrE-Ld] [XXXXXX]

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

[SAvE]

Save your eCal calibration by pressing < [key] > key or press < [key] > key to leave without saving the eCal calibration.

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.*

5.6 Metrological Data Block [8--]

[80-] Legal Metrologic Records

[800]   Counter

This counter increases by 1 automatically after entering the programming mode with calibration jumper and service password. This counter cannot be changed manually.

5.7 Diagnostics [9--]

The operations about checking and testing FT-10 FLOW can be made here.

[90-] Tests

[900   ]   Key Pad testing

In this step every activated key will be shown on the display as ASCII code. By this way you can test the functionality of all keys. Press < [*↵] > key for 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 shown 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 shown on display.

[903   ]   Parallel Inputs [ı X   Y]

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

[905   ]   mV Indication

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

[99-] Printing Parameter Values

[990]   Print All Parameters

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

[991]   Load Default

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

6. FILLING MODE

FT-10 FLOW discontinuous weighing controller is a controller which controls the flow rate of the material and transfers the material to the preset total target value. Flow rate is adjusted automatically to the flow rate target value. If total target value is entered, weighing controller adjusts the filling weights automatically for accurate transfer of the material. The flow rate, estimated daily total, and total value can be displayed.
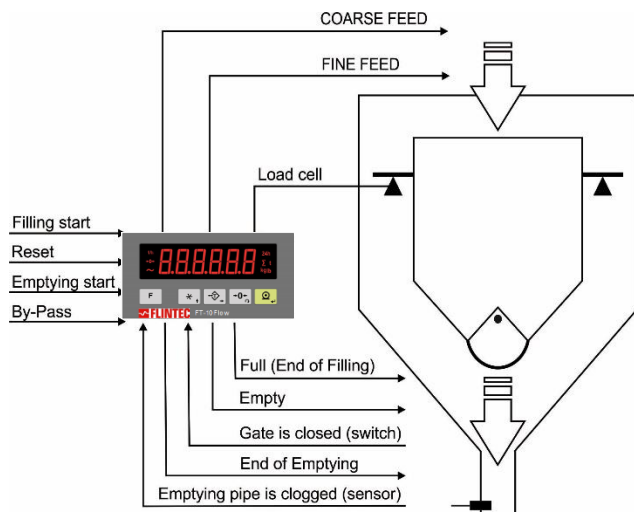
Weighing Operation :

- The weighing controller empties the hopper after applying filling start input.
- The hopper fills up to target value accurately in 2 speeds.
- The filled hopper empties after applying emptying start input, if emptying pipe is not clogged.
- Emptying time changes automatically to control the flow rate target.
- The material transfer goes on until removing filling start input.
- Automatic target value adjustment for total of material transfer accuracy.

Application Related Parameters :
The application related parameters shall be entered before start up the weighing process. Please enter the values below carefully for better system performance.

Display	Operation
[**123.456** kg]	Press long [*] key, until [**ton-hr**] prompt appears.
[**ton-hr**] ↻ [XXXXX]	**Flow rate.** If the application requires material flow rate control, enter the flow rate by pressing [ ] and [ ] keys. Press the [ ] key to go to the next parameter. The [0] value operates the system without flow control.
[**S-Qty**] ↻ [XXXXX]	**Sampling Quantity.** Flow rate is calculated with the last transferred material at sampling quantity weighing. Increasing the sampling quantity it gives more accurate result with longer settling time. This value should be optimized for the best system response. Enter the sampling quantity value by pressing [ ] and [ ] keys. Press the [ ] key to go to the next parameter.
[**t-trgt**] ↻ [XXXXX]	**Total target.** If this parameter value is bigger than zero, the controller adjusts filling target automatically to transport the total target of material. Operation ends after transferring the material at total target value. [000000] means continuous operation without total control. Enter the total target value by pressing [ ] and [ ] keys. Press the [ ] key to go to the next parameter.

[**Zero_r**] ↻ [XXXXX]	**Zero range.** If the weight decreases in this range at Emptying, the scale is accepted empty and the gate is closed. Enter zero range value by pressing [key] and [key] keys. Press the [key] key to go to the next parameter.
[**d_dISC**] ↻ [X.X]	**End of emptying delay.** After the weight value goes into zero range at emptying, this parameter delays closing the gate for completely emptying. Enter the value by pressing [key] and [key] keys. Press the [key] key to go to the next parameter. Maximum value is 9.9 seconds. Default is 0.0 seconds.
[**d_GAtE**] ↻ [X.X]	**Gate control delay.** This parameter has two functions; 1. If there is no gate switch (GAT_Ch = 0), this time delays "End of emptying" output. 2. If there is a gate switch (GAT_Ch = 1), this time delays to check the gate position. Enter gate control delay value by pressing [key] and [key] keys. Press the [key] key to go to the next parameter. Maximum value is 9.9 seconds. Default is 0.0 seconds.
[**GAT_Ch**] ↻ [X]	**Gate position check** 0 = No gate switch 1 = Gate switch function is enable Enter gate position check value by pressing [key] and [key] keys. Press the [key] key to go back to the operation. Default is "0".

Note: For **TARGET** and **TOLERANCE** entry please see section 7, page 43.

Application Related Display Messages:

The messages below are shown on the display in the filling cycle or if there is any error in the filling.

Display	Operation
[-**Zero**-]	It is displayed during automatic zeroing before feeding. Refer to par. [**506**].
[**GAtE**]	It is displayed during gate position control.
[**FuLL**] ↻ [XXXXX]	This prompt is displayed at the end of Filling and toggling with the weight value. It disappears when emptying starts.
[**d_dEL**]	Emptying delay time in function.
[**End**]	The total target of material is transferred and operation is ended. If "filling start" input comes after this message, Total-1 value is cleared and starts next batch.
[**bYPASS**]	By-Pass operation. Feeding and Empty outputs are activated and ton/hour value is cleared at By-pass operation. "emptying pipe is clogged" sensor is in function at by-pass operation.
[**E GAtE**]	Gate position error.
[**E FEEd**]	This message is appeared by the "emptying pipe is clogged" sensor to announce the emptying process is paused. The message disappears automatically after opening the pipe line.
[**nO FEEd**]	Feeding error message appears, if weight value is not increased in a preset time (refer to parameter [**508**]). In this case, status of feeding outputs do not change. The message disappears as automatically after starting the feeding.

Application Related Information on the Display:

The information below are shown on the display by pressing < [F] > key sequentially;

Display	Description
1/h and **unit**	**The actual flow rate.** To change the flow rate enter to the application related parameters.
24h and **unit**	**Estimated 24h total.** Calculated daily total, if system's flow rate is equal to the actual flow rate at the following 24 hours.
Σ	**Total**. The total values are displayed at accuracy defined by parameter [**200**] until displaying over range. [------] promptly announced to warn over range at OIML usage; or the decimal point is disabled to increase the total value displaying range at non- OIML applications before displaying [------] prompt. To clear the Total, press < [→0←] > key at this prompt at basic weighing mode. Press < [Φ] > key for clearing the total at [**Clear**] prompt. Or press < [F] > key to escape. To display another total refer to parameter [**116**] (Page 32).

Filling cycle

Press < [→0←] > key if the scale is not indicated zero after powered on. Apply filling start input to start the weighing. Flow rate control is done as shown below.

If the weight is more than zero range, the hopper is emptied after applying the filling start input. 2 speed feeding is started after automatic zeroing the scale. The [**FuLL**] prompt is displayed after end of the filling. If the start emptying input is active, the hopper is emptied.

The controller calculates the flow rate after each filling and adjusts the flow rate automatically to the flow rate target value.

The process ends after deactivating the filling start input and emptied the last filled material.

Weight

Target

Weight 1   Weight 2

Target n = Total Target - Total (n-1)

Time

Signal	
Start filling	(Inp 1)
Zeroing delay & Zeroing	
Coarse feed	(Out 1)
Weight control delay	
Fine feed	(Out 2)
Weight reading	
End of filling	(Out 4)
Start emptying	(Inp 2)
Empty	(Out 3)
Gate is closed	(Inp 3)
End of emptying	(Out 5)
End	

Coarse   Fine   Emptying   Coarse   Fine   Emptying   Coarse   Fine   Emptying   Next batch

Start   1st Emptying   2nd Emptying   n th Emptying

Note:

*The fine feed output is activate together with coarse feed output if parameter [**501**] is 1 as indicated in the drawing above. If this parameter is adjusted to 0, the fine feed output is activated after coarse feeding.*

Digital Inputs and Outputs Connection:

I / O	Descriptions
Input 1	Start for filling
Input 2	Start for emptying
Input 3	Gate is closed
Input 4	Reset
E	Emptying pipe is clogged (from sensor on the material transfer pipe)
Z	By-Pass input (By-pass starts 3 seconds later activating the By-pass input)
Output 1	Coarse feed
Output 2	Fine feed
Output 3	Empty
Output 4	Full (end of filling)
Output 5	End of emptying

Example of a Connection Diagram:
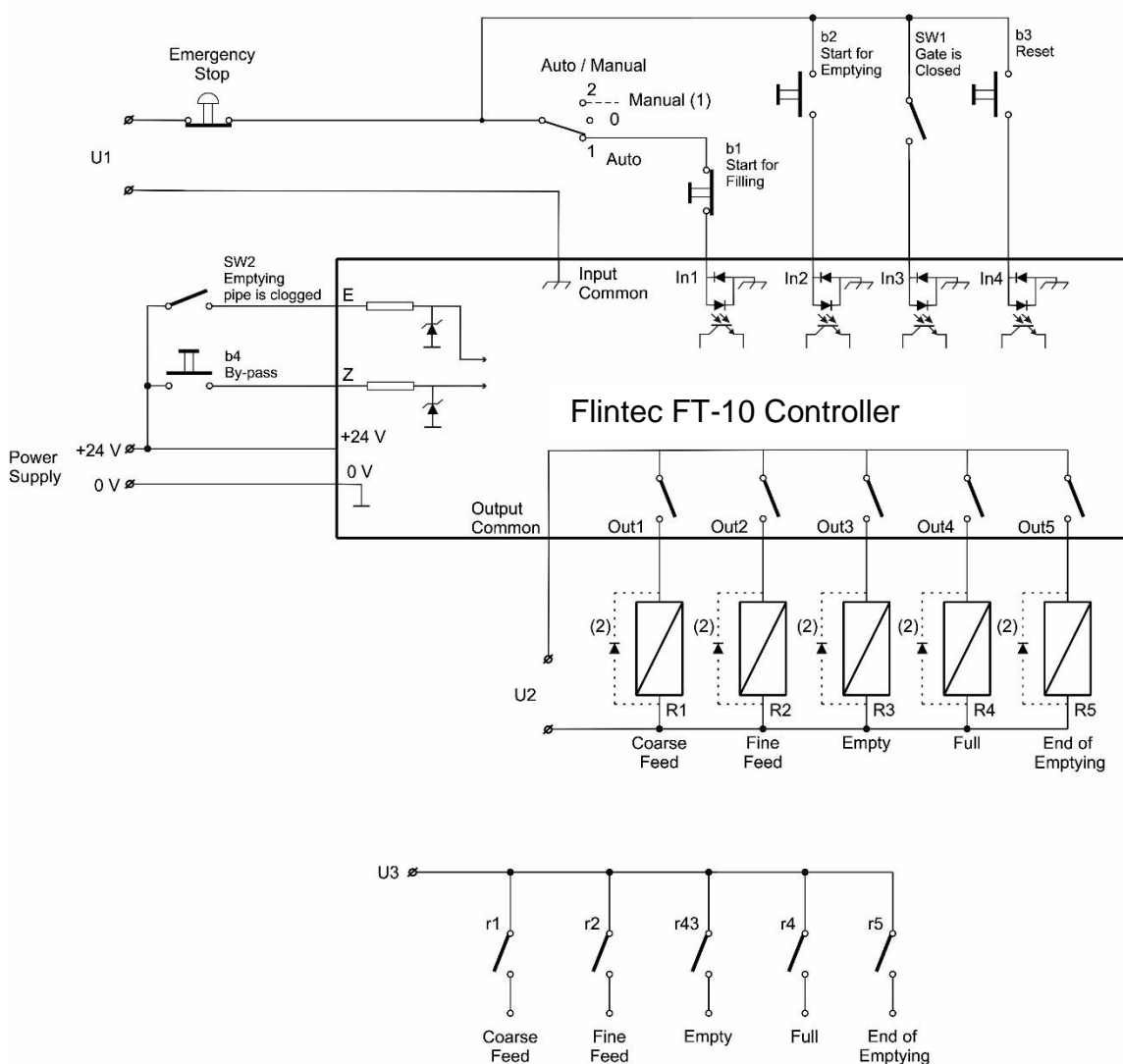
[1] Manual control circuitry is not indicated.

[2] Very important: If Outputs are supplied DC, reverse diodes should always be installed.

7. FILLING TARGET AND PRESET VALUES ENTRY

Filling related target, coarse lead in and fine lead in values are entered by pressing < [*] > key and following the table below.

Display	Operation
[**123.456** kg]	Press [*] key to enter the menu. [**tArGEt**] prompt seen.
[**tArGEt**] ↻ XXXXX]	**Filling Target Entry** Target prompt and its value are toggled on the display. Enter target value by pressing [ ] and [+0+] keys. Press the [⊙] key to go to the next parameter.
[**CoArSE**] ↻ [XXXXX]	**Preset Values (Cut-off) Entry** Coarse prompt and its value are toggled on the display. Coarse lead in = Target – Coarse cut-off Enter coarse value by pressing [ ] and [+0+] keys. Press the [⊙] key to go to the next parameter.
[**FinE**] ↻ XXXXX]	Fine prompt and its value are toggled on the display. Fine lead in = Target – Fine cut-off Enter fine value by pressing [ ] and [+0+] keys. Press the [⊙] key to go back to the operation.

Warning:

1) *Changing target value does not require changing the coarse lead in and fine lead in values.*

2) *Coarse and fine values must be entered carefully to start filling.*

8. FILLING PARAMETERS [5--]

In this section, the main filling parameters to configure the device are defined.

[501   1] Feeding Type
0 : Coarse and Fine feeding are enabled sequentially
1 : Coarse&Fine and Fine feedings are enabled sequentially

[502 50] Preact Correction Factor
The material flow may change because of temperature, viscosity, the height of the material changes, etc. This causes the filling errors and the fine value is needed to be changed accordingly.
FT-10 FLOW follows the filling errors and adjusts the new preact value for the next filling cycle. The adjustment rate is defined by this parameter in percent. The new preact value is calculated by the formula below:

$$\text{New fine lead in} = \text{Fine lead in} + \left[\frac{(\text{Actual} - \text{Target}) * \text{Preact Correction Factor}}{100}\right]$$

[504   1.0] Check Delay
Delay time after end of feeding to start stability check.

[505   250] Zeroing Period
[XXXXXX]
This parameter defines the automatic zeroing period in second. The zeroing is performed automatically at the following filling after this time. The value entered here shall be less than the value calculated at the OIML R-61 section A.5.3.5 for approved usage. If the zeroing will be done each filling, this value shall be entered less than minimum filling time.
Maximum value is 5399 sec (90 minutes).

[506 2.0] Zeroing Delay
This parameter defines the zeroing delay time before zeroing. Maximum value is 9.9 seconds.

[507   0] Indication at the End of Filling
0 : The last filling value and [**FuLL**] message toggles at the end of the filling.
1 : Actual value and [**FuLL**] message toggles at the end of the filling.

[508   100] Feeding Check Time
[XXXXXX]
This parameter defines feeding check time in second. If there is no material flow within this period, [**nO FEEd**] message is displayed and ton/hour value is zeroed.
Entry can be between 010 to 599 sec (10 minutes).

Warning: *In this case, FT-10 FLOW waits for a resumption of the flow of material without changing the status of the feed outputs.*

[509 999999] Maximum Filling Weight
[XXXXXX]
This parameter limits the maximum Target value entry.

9. SERIAL DATA OUTPUTS

FT-10 FLOW filling controller family has different kind of serial interfaces like RS232, RS485 and Ethernet etc. In this section, you will 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.

9.1 Continuous Data Output

Continuous data output of the instrument is transmitted in the following data structure. The serial ports of FT-10 FLOW 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 FLOW; the controller 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			
0	0	0	XXXXOO	1	0	X 1	Always 1	Always 1	X
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	Always = 0	
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.*

9.2 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 controller 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)

9.3 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 more than one interface. The print mode output is transmitted automatically after each filling or by pressing < ⊙ > key in basic weighing mode (ready status).

Single Line

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

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

CN			GROSS			TARE			NET			
M S D		L S D	S P	M S D		L S D	S P	M S D		L S D	S P	M S D		L S D	L F	C R

| 9 | | 3 | 13 | | 3 | 13 | | 3 | 13 | | 1 | 1 |

Multi Line Formats

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 for 2 different printer types.

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

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

Multi Line-24 Format for wider printers   Multi Line-16 Format for 16 character printers

9.4 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:

A general description of the response is the following:

[ADR][COMMAND][STATUS][SIGN][WEIGHT/FORCE][CHK][CR][LF]

Response format without weight:

[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
G	Read voltage value of DC power supply
I	Read current weight (indicated) value immediately
P	Print: Read the current stable weight value
S	Read Status
T	Tare
U	Read digital inputs
V	Read 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
−	Under load

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)

<u>Comments</u>: 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)

<u>Comments</u>: 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)

<u>Comments</u>: The response status is always Ack in weighing or force mode.

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)

<u>Comments</u>: Voltage value is 3 byte and sends with 0.1 V increment.

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)

<u>Comments</u>: 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.

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 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][A][Inputs]

Example :

    Command : 01U

    Response : 01UA23   (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][A][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			

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 cannot 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 cannot 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'

10. MODBUS RTU

FT-10 FLOW controller has a Modbus RTU interface over RS485 / RS232C serial port. This interface can be programmable to High-Low or Low-High for different type of PLC's. You can find below the difference of these data formats and some companies using these formats. Two types are available as;

10.1 Modbus RTU Data Structure

After programming RS485 / RS232C serial port for Modbus RTU, it can be used as a Modbus RTU slave on Modbus RTU network. The Modbus slave address is defined in the RS-485 address (Page 28). Functions code '0x03' and '0x10' 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.

Parameter's set-up:

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 27.

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	Actual 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	Not used			
				D5	0 - No process error		1 – Process error (refer to 40113)	
				D6 – 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	
				8	Start for filling	
				9	Reset	
				14	Start for emptying	
				15	By-Pass function enable	
				16	By-Pass function disable	
40010	R/W	1	Not used			
40011	R/W	2	Target value	Refer to page 25		
40013	R/W	2	Not used			
40015	R/W	2	Coarse value	Refer to page 25		
40017	R/W	2	Fine value	Refer to page 25		
40019	R/W	1	CN (Label number)	Refer to parameter [142] on page 32		
40020	R	2	Last filling value			
40022	R/W	1	Quantity			
40023	R/W	2	Total-1	Erasable total		
40025	R	1	Digital inputs status	D0	Input-1	0 – Passive
				D1	Input-2	1 - Active
				D2	Input-3	
				D3	Input-4	
40026	R	2	Digital outputs status	D0	Output-1	0 – Passive
				D1	Output-2	1 - Active
				D2	Output-3	
				D3	Output-4	
				D4	Output-5	
40028	R/W	2	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 ( )	
				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 Calibration Process Status	Dec	Description
					1	Ready for calibration
					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 cannot be calibrating - Check load cell cable - Re-energize the instrument
					34	Instrument cannot be calibrating - Load cell signal is very low or too high
					35	Calibration Error - Calibration loading is not enough - Check test weight loading or LC connections
					36	Calibration load value entry Error - Test weight is too small. Increase the 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	6	Not used			
			Application Parameters			
40040	R/W	2	D_DISC	End of emptying delay		
40042	R/W	2	D_GATE	Gate control delay		
40044	R/W	2	ZERO_R	Zero range		
40046	R/W	2	T_TRGT	Total target		
40048	R/W	2	TON_HR	Flow rate		
40050	R/W	2	S_QTY	Sampling Quantity		
40052	R/W	2	GAT_CH	Gate position check		
40054	R/W	17	Not used			
40071	R	1	Actual weight	(image of register 40001)		
40072	R	1	Status	(image of register 40003)		
40073	R	1	Tare weight	(image of register 40004)		
40074	R	1	Gross weight	(image of register 40006)		
40100	R	1	Voltage of Power Supply	Voltage of power supply is indicated with 0.1 V increment. For example: 23.4 VDC is indicated as integer 234 value.		

40101	R	2	Ton/hour indication	The actual flow rate	
40103	R	2	24 hours indication	Estimated daily total	
40105	R/W	2	Total-1	Erasable total (Image of register 40023)	
40107	R	2	Total-2	The current day's total	
40109	R	2	Total-4	Yesterday's total	
40111	R	2	Total-3	Non-erasable total	
40113	R	1	Process Warning Messages	Dec	Description
				0	No process error
				1	END
				2	BY-PASS
				3	NO FEED
				4	RESET
			Process Error Messages	128	E GATE
				129-135	Not used
				136	E FEED
40114	R	1	Process state	0	No process (Adc out, Over, Under etc.)
				1	Ready
				2	In filling process
				3	End of filling (FULL)
				4	In discharging process
				5	Delay of flow rate control ([d_tonh] message)
42000	R/W	1	Filter	Refer to parameter [120] on page 32	
42001	R/W	1	Not used		
42002	R/W	1	Zeroing Range	Refer to parameter [203] on page 33	
42003	R/W	1	Auto Zero Tracking	Refer to parameter [204] on page 33	
42004	R/W	1	Not used		
42005	R/W	1	Motion Detector	Refer to parameter [206] on page 33	
42006	R/W	2	Not used		
42008	R/W	2	Capacity	Refer to parameter [212] on page 33	
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
42101	R/W	1	Feeding type	Refer to parameter [501] on page 44	
42102	R/W	1	Preact correction factor	Refer to parameter [502] on page 44	
42103	R/W	1	Not used		

42104	R/W	1	Check delay	Refer to parameter [504] on page 44
42105	R/W	1	Zeroing period	Refer to parameter [505] on page 44
42106	R/W	1	Zeroing delay	Refer to parameter [506] on page 44
42107	R/W	1	Indication at the end of filling	Refer to parameter [507] on page 44
42108	R/W	1	Feeding check time	Refer to parameter [508] on page 44
42109	R/W	1	Maximum filling weight	Refer to parameter [509] on page 44

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

Programming steps of frequent used ……

Reading a weight value:
1. Read 40003 (or 40008, 40073),
2. Check D0=0, D1=1and D5=0,
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 or if D5=1, check the process error messages from 40105.

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
"Start for filling" Command	01,10,00,08,00,01,02,00,08,A6,DE
"Start for emptying" Command	01,10,00,08,00,01,02,00,0E,26,DC
"Reset" Command	01,10,00,08,00,01,02,00,09,67,1E
Zero Command	01,10,00,08,00,01,02,00,01,66,D8
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
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

11. PROFIBUS (ONLY FT-10 FLOW 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 FLOW PB controller, you can communicate with the instrument. GSD file is available in CD which is supplied together with the instrument or on internet www.flintec.com.

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

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

[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 FLOW will be entered via keypad between 001 to 126.

There are two LEDs near the Profibus connector which are ;
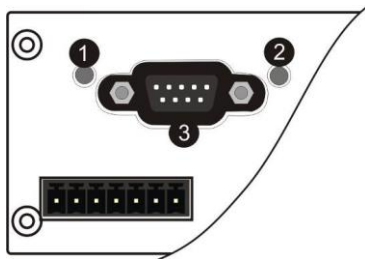
1	OP Operation mode LED
2	ST Status LED
3	Profibus Connector

OP Operation mode LED

State	Indication	Comment
Off	Not online /No power	Check power and cable
Green	On-line, data exchange	-
Flashing Green	On-line, clear	-
Flashing Red (2 flash)	PROFIBUS configuration error	Check GSD file configuration.

ST Status LED

State	Indication	Comment
Off	Not power or not initialized	No power or profibus module is in initialization state
Green	Initialized	
Flashing Green	Initialized, diagnostic event(s) present	Diagnostic is active
Red	Exception error	There is an exception error

11.1 Data Format

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

11.2 GSD / GSDML Configuration

Profibus / Profinet data consist of 2 x Input 2 words and 2 x Output 2 words. GSD / GSDML configuration for PLC programmers is shown in Figure 11.1.
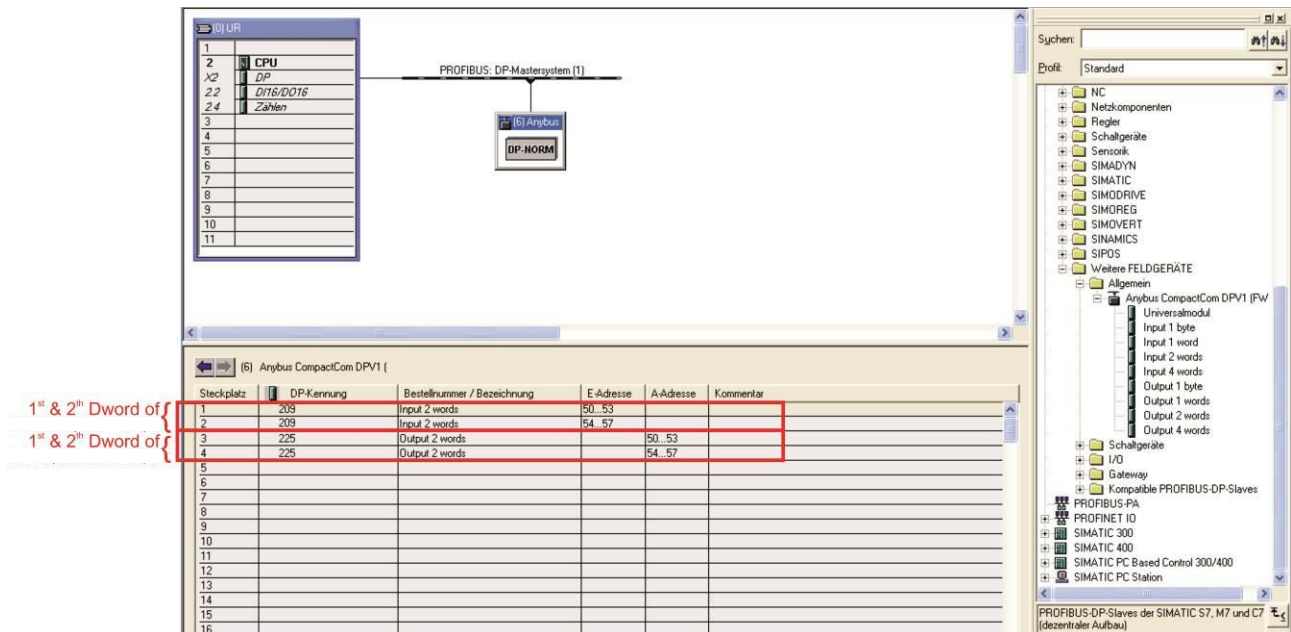
Figure 11.1 – GSD / GSDML Configuration

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

11.3 Profibus DP / Profinet Data Structure

FT-10 FLOW 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, Actual weight value is represented. To represent other weight or calibration status, refer to next Dword.														
2nd Dword				Out 5	Out 4	Out 3	Out 2	Out 1				In 4	In 3	In 2	In 1
	Error codes of FT-10 FLOW Px					Process Error		Zero range	Gross Net	MD	Read command response				Cmd Flg

FT-10 FLOW Px Output to PLC Input 2nd Dword

Bit Number	2nd Dword Description			
D31 … D24	Outputs	Output bit status (Active = 1)		
D23 … D16	Inputs	Input bit status (Active = 1)		
D15 … D12	Error Codes of FT-10 FLOW Px	**Bin**	**Dec**	**Descriptions**
		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	Not in use			
D10	Process Error	0		No error
		1		Process error (Check the 'Process error messages´)
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	Actual weight (Net if the indication is in Net)
		00001	1	Gross weight
		00010	2	Tare weight
		00011	3	Calibration Status (Refer to Table 11.2)
		00100 01110	4 14	Not used
		01111	15	Total-3 (Non-erasable total)
		10000	16	Not used
		10001	17	Target value
		10010	18	Not used
		10011	19	Coarse value
		10100	20	Not used
		10101	21	Fine value
		10110	22	Label number (CN) (Always integer)
		10111	23	Last filling value
		11000	24	Quantity (Always integer)
		11001	25	Total-1 (Erasable total)
		11010	26	Total-2 (The current day's total)
		11011	27	Total-4 (Yesterday's total)
		11100	28	Ton / hour indication (The actual flow rate)
		11101	29	24 hours indication (Estimated daily total)
		11110	30	Process error messages (Refer to Table 11.1)
		11111	31	Use the Expanded Command list (Refer toTable 11.3)
D0	CMD Flag	Toggles		The command is applied successfully

Process error messages (always 32 bit integer)

1st Dword descriptions when read command is 'Process error messages'. Refer to 2nd Dword of PLC Output to FT-10 FLOW Px Input

Bit Number	1st Dword Description			
D31 … D16	Not in use			
D15 … D8	Process State	**Bin**	**Dec**	**Process state**
		00000000	0	No process (Adc out, Over, Under etc.)
		00000001	1	Ready
		00000010	2	In filling process
		00000011	3	End of filling (FULL)
		00000100	4	In discharging process
		00000101	5	Delay of flow rate control ([d_tonh] message)
D7 ... D0	Process warning Messages	**Bin**	**Dec**	**Messages**
		00000000	0	No process error
		00000001	1	END
		00000010	2	BY-PASS
		00000011	3	NO FEED
		00000100	4	RESET
	Process error Messages	10000000	128	E GATE
		10000001	129	Not used
		10000111	135	
		10001000	136	E FEED

Table 11.1– Process error messages

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 FLOW Px Input

Bit Number	1st Dword Description			
D31 … D16	Not in use			
D15 … D8	Calibration Errors	**Bin**	**Dec**	**Commands**
		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 1st Dword of PLC Output to FT-10 FLOW PB 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 11.2 - Calibration status

PLC Output to FT-10 FLOW 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

<table>
<tr><td>1st Dword</td><td colspan="16">Next Dword defines the usage of this Dword.</td></tr>
<tr><td rowspan="2">2nd Dword</td><td colspan="2"></td><td>SFE</td><td>Reset</td><td>Filling Start</td><td>BY-PASS</td><td colspan="2">Not in use</td><td colspan="8">Expanded Commands List</td></tr>
<tr><td colspan="5">Not in use</td><td colspan="5">Command List</td><td colspan="5">Read Data Selection</td><td>New CMD</td></tr>
</table>

PLC Output to FT-10 FLOW Px Input 2nd Dword

Bit Number	2rd Dword descriptions				
D31 … D30	Not used				
D29	Start for emptying (SFE)	A transition form 0 to1 activates the “Start for emptying” command.			
D28	Reset	A transition form 0 to1 activates the “Reset” command.			
D27	Start for filling	A transition form 0 to1 activates the “Start for filling” command.			
D26	By-Pass	A transition from 0 to1 activates the by-pass function and transition from 1 to 0 deactivates the by-pass function.			
D25 … D24	Not used				
D23 … D16	Expanded Commands List (Refer to Table 11.3)				
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

		01000	8	Average mV/V value [1]	Coefficients
		01001	9	Dead Load value [1]	
		01010	10	Save the coefficients of eCal	Refer to par. [313]
		01011 10000	11 16	Not used	
		10001	17	Target value [1]	
		10010	18	Not used	
		10011	19	Coarse value [1]	
		10100	20	Not used	
		10101	21	Fine value [1]	
		10110	22	Label number (CN) (Always integer) [1]	
		10111	23	Not used	
		11000	24	Quantity (Always integer) [1]	
		11001	25	Total-1 [1] (Erasable total)	
		11010 11110	26 30	Not used	
		11111	31	Use the Expanded Command list (Refer to Table 11.3)	
D5 ... D1	Read Data Selection	00000	0	Actual weight (Net if the indication is in Net)	
		00001	1	Gross weight	
		00010	2	Tare weight	
		00011	3	Calibration Status (Refer to Table 11.2)	
		00100 01110	4 14	Not used	
		01111	15	Total-3 (Non-erasable total)	
		10000	16	Not used	
		10001	17	Target value	
		10010	18	Not used	
		10011	19	Coarse value	
		10100	20	Not used	
		10101	21	Fine value	
		10110	22	Label number (CN) (Always integer)	
		10111	23	Last filling value	
		11000	24	Quantity (Always integer)	
		11001	25	Total-1 (Erasable total)	
		11010	26	Total-2 (The current day's total)	
		11011	27	Total-4 (Yesterday's total)	
		11100	28	Ton / hour indication (The actual flow rate)	
		11101	29	24 hours indication (Estimated daily total)	
		11110	30	Process error messages (Refer to Table 11.1)	
		11111	31	Use the Expanded Command list (Refer to Table 11.3)	
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

Expanded Command List (always 32 bit integer)

Here 1st Dword is the data receiving from PLC and the "D23 … D16" bits describes below.

Bit No	Description						
		Bin	**Dec**	**R/W**	**Commands**		
		00000000	0	R	Voltage of Power Supply	Voltage of power supply is indicated with 0.1 VDC increment.	
		00000001 00011111	1 31	Not in use			
					Application Parameters [1]		
		00100000	32	R/W	D_DISC	End of emptying delay	
		00100001	33	R/W	D_GATE	Gate control delay	
		00100010	34	R/W	ZERO_R	Zero range	
		00100011	35	R/W	T_TRGT	Total target	
		00100100	36	R/W	TON_HR	Flow rate	
		00100101	37	R/W	S_QTY	Sampling Quantity	
		00100110	38	R/W	GAT_CH	Gate position check	
		00100111 00111111	39 63	Not used			
		01000000	64	R/W	Filter [1]	Refer to par. [120], page 32	
		01000001	65	Not used			
		01000010	66	R/W	Zeroing Range [1]	Refer to par. [203], page 33	
		01000011	67	R/W	Auto Zero Tracking [1]	Refer to par. [204], page 33	
		01000100	68	Not used			
D23…D16	Expanded Commands List	01000101	69	R/W	Motion Detector [1]	Refer to par. [206], page 33	
		01000110 01000111	70 71	Not used			
		01001000	72	R/W	Capacity [1]	Refer to par. [212], page 33	
		01001001	73	R/W	Decimal point [1]	0	XXXXOO
						1	XXXXXO
						2	XXXXXX
						3	XXXXX.X
						4	XXXX.XX
						5	XXX.XXX
		01001010	74	R/W	Increment [1]	1	X1
						2	X2
						3	X5
		01001011 01100000	75 96	Not Used			
		01100001	97	R/W	Feeding type [1]	Refer to par. [501], page 44	
		01100010	98	R/W	Preact correction factor [1]	Refer to par. [502], page 44	
		01100011	99	R/W	Not used		
		01100100	100	R/W	Check delay [1]	Refer to par. [504], page 44	
		01100101	101	R/W	Zeroing period [1]	Refer to par. [505], page 44	
		01100110	102	R/W	Zeroing delay [1]	Refer to par. [506], page 44	
		01100111	103	R/W	Ind. at the end of filling [1]	Refer to par. [507], page 44	
		01101000	104	R/W	Feeding check time [1]	Refer to par. [508], page 44	
		01101001	105	R/W	Maximum filling weight [1]	Refer to par. [509], page 44	

Table 11.3 - 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 D11…D15 bits of 'FT-10 FLOW PB 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.

12. PROFINET (ONLY FT-10 FLOW PN)

The Profinet interface operates at 100Mbit, full duplex, as required by Profinet. GSDML file is available on CD which is supplied together with the instrument or on internet www.flintec.com .

[06-] Profinet (Only FT-10 FLOW PN)

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

[060 0] Data Format

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

There are 4 announcement LEDs on rear panel to show the instrument status in operation.
The meanings of these LED's are;
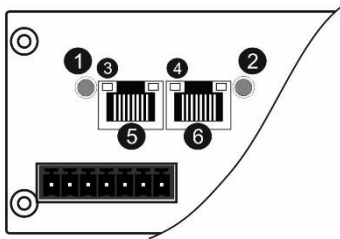
1	NS Network Status LED
2	MS Module Status LED
3	Link/Activity LED (port 1)
4	Link/Activity LED (port 2)
5	P1 Profinet interface (port 1)
6	P2 Profinet interface (port 2)

NS Network Status LED

LED State	Description	Comment
Off	Not online /No power	Check power and cable
Green	On-line (RUN)	-
Green, flashing	On-line (STOP)	-

MS Module Status LED

LED State	Description	Comment
Off	Not power or not initialized	No power or profinet module is in initialization state
Green	Initialized	
Green, 1 flash	Initialized, diagnostic event(s) present	Diagnostic is active
Red	Exception error	There is an exception error
Red, 1 flash	Configuration Error	Check GSDML configuration
Red, 2 flashes	IP Address Error	IP address not set
Red, 3 flashes	Station Name Error	Station name not set
Red, 4 flashes	Internal Module Error	Re-energize the instrument. If seen again, change the board.

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

LINK/Activity LED

LED State	Description	Comment
Off	No Link	No link, no communication present
Green	Link	Ethernet link established, no communication present
Green, flickering	Activity	Ethernet link established, communication present

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 Profinet Parameters

There are 7 parameters for Profinet network and Profinet set up is done by IndFace1x (EtherX PC) software over Local Network Area as described in this section. EtherX PC software is available in CD which is supplied together with the instrument or on internet 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 ' '.

12.3 GSDML Configuration

Profinet data structures of FT-10 FLOW PN include 2 x Input 2 words and 2 x Output 2 words. GSDML configuration for PLC programmers, same as for Profibus, is shown on Page 59.

12.4 Profinet Data Structure

Profinet Data Structur is the same as Profibus Data Structur. This can be found on page 59

13. ETHERNET TCP/IP (ONLY FT-10 FLOW EN)

Ethernet output of FT-10 FLOW 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 found 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 47	
Continuous	Refer to Page 47	-
Fast Continuous	Refer to Page 46	-
Modbus TCP High-Low	Modbus TCP interfacing. Refer to Page 70.	Interfacing with PLC.
Modbus TCP Low-High	Modbus TCP interfacing. Refer to Page 70.	Interfacing with PLC.

Table 13.1 - Ethernet output interfacing

You can communicate with the controller after programming Ethernet TCP/IP and Modbus TCP related parameters [**03-**] on Page 29.

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

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

[030   5] Data Format

0 : No data transfer.
1 : Continuous data output   (Page 45)
2 : Print mode   (Parameter [**040**]   (Page 30)
3 : BSI command set   (Page 47)
4 : Modbus TCP High-Low (*)   (Page 70)
5 : Modbus TCP Low-High (*)   (Page 70)
6 : Fast continuous mode   (Page 46)

(*) **Warning :** *Parameter [**000**] and [**010**] should not be selected Modbus RTU.*

[031 001] Device Address
The address of FT-10 FLOW will be entered between 000 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⟩ > key and enter the first 3 "a" digits of the IP address.

Press < ⟨key⟩ > key to access the following "b", "c" and "d" address entries.

Press the < ⟨key⟩ > 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

13.1 Ethernet Setup

There are 11 parameters for Ethernet network and Ethernet set up for Local Network Area as described in this section. For settings IndFace1x (EtherX PC) software can be used or you can entry parameter [**03-**] blocks. EtherX PC software is available on CD which is supplied together with the instrument or on internet www.flintec.com.

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.
Password Ethernet: Factory default password is **123456**.

13.2 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 '0x10' (Preset Multiple Regs) 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's 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 as defined on Page 29.

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	Actual 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	Not used		
				D5	0 - No error in process	1 – Process error (refer to 40113)	
				D6 – 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		

Register	R/W	Size	Name	Dec	Description	
				1	Zero	
				2	Tare	
				3	Clear	
				4	Print	
				8	Start for filling	
				9	Reset	
				14	Start for emptying	
				15	By-Pass function enable	
				16	By-Pass function disable	
40010	R/W	1	Not used			
40011	R/W	2	Target value	Refer to page 25		
40013	R/W	2	Not used			
40015	R/W	2	Coarse value	Refer to page 25		
40017	R/W	2	Fine value	Refer to page 25		
40019	R/W	1	CN (Label number)	Refer to parameter [142] on page 32		
40020	R	2	Last filling value			
40022	R/W	1	Quantity			
40023	R/W	2	Total-1	Erasable total		
40025	R	1	Digital inputs status	D0 Input-1 / D1 Input-2 / D2 Input-3 / D3 Input-4	0 – Passive / 1 - Active	
40026	R	2	Digital outputs status	D0 Output-1 / D1 Output-2 / D2 Output-3 / D3 Output-4 / D4 Output-5	0 – Passive / 1 - Active	
40028	R/W	2	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) / 250 Average mV/V (1) / 171 Dead Load (1) / 23205 Save the coefficients of eCal	eCal Coefficients	
40031	R/W	2	Span Calibration Value / LC capacity / mV value / Dead load value			
40033	R	1	Calibration Status	D0 .. D7 Calibration Process Status	Dec Description / 1 Ready for calibration / 3 Zero calibration in process … / 4 Span calibration in process … / 9 Error (Refer to D8 ... D15) / 1 Calibration Timeout - Restart calibration	

					2	ADC Error - Re-energize the instrument - If seen again, change the board.
				D8 .. D15 Calibration Errors	3	Instrument cannot be calibrating - Check load cell cable - Re-energize the instrument
					34	Instrument cannot 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 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	6	Not used			
			Application Parameters			
40040	R/W	2	D_DISC	End of emptying delay		
40042	R/W	2	D_GATE	Gate control delay		
40044	R/W	2	ZERO_R	Zero range		
40046	R/W	2	T_TRGT	Total target		
40048	R/W	2	TON_HR	Flow rate		
40050	R/W	2	S_QTY	Sampling Quantity		
40052	R/W	2	GAT_CH	Gate position check		
40054	R/W	17	Not used			
40071	R	1	Actual weight	(image of register 40001)		
40072	R	1	Status	(image of register 40003)		
40073	R	1	Tare weight	(image of register 40004)		
40074	R	1	Gross weight	(image of register 40006)		
40100	R	1	Voltage of Power Supply	Voltage of power supply is indicated with 0.1 V increment. For example: 23.4 VDC is indicated as integer 234 value.		
40101	R	2	Ton/hour indication	The actual flow rate		
40103	R	2	24 hours indication	Estimated daily total		
40105	R/W	2	Total-1	Erasable total (Image of register 40023)		
40107	R	2	Total-2	The current day's total		
40109	R	2	Total-4	Yesterday's total		
40111	R	2	Total-3	Non-erasable total		
40113	R	1	Process warning Messages	Dec	Description	
				0	No process error	
				1	END	

				2	BY-PASS
				3	NO FEED
				4	RESET
			Process Error Messages	128	E GATE
				129-135	Not used
				136	E FEED
40114	R	1	Process state	0	No process (Adc out, Over, Under etc.)
				1	Ready
				2	In filling process
				3	End of filling (FULL)
				4	In discharging process
				5	Delay of flow rate control ([d_tonh] message

42000	R/W	1	Filter	Refer to parameter [120], page 32
42001	R/W	1	Not used	
42002	R/W	1	Zeroing Range	Refer to parameter [203], page 33
42003	R/W	1	Auto Zero Tracking	Refer to parameter [204], page 33
42004	R/W	1	Not used	
42005	R/W	1	Motion Detector	Refer to parameter [206], page 33
42006	R/W	2	Not used	
42008	R/W	2	Capacity	Refer to parameter [212], page 33

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

42101	R/W	1	Feeding type	Refer to parameter [501], page 44
42102	R/W	1	Preact correction factor	Refer to parameter [502], page 44
42103	R/W	1	Not used	
42104	R/W	1	Check delay	Refer to parameter [504], page 44
42105	R/W	1	Zeroing period	Refer to parameter [505], page 44
42106	R/W	1	Zeroing delay	Refer to parameter [506], page 44
42107	R/W	1	Indication at the end of filling	Refer to parameter [507], page 44
42108	R/W	1	Feeding check time	Refer to parameter [508], page 44
42109	R/W	1	Maximum filling weight	Refer to parameter [509], page 44

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

Programming steps of frequent used

Reading a weight value:

1. Read 40003 (or 40008, 40073),
2. Check D0=0, D1=1and D5=0,
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 or if D5=1, check the process error messages from 40105.

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 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
"Start for filling" Command	01,10,00,08,00,01,02,00,08
"Start for emptying" Command	01,10,00,08,00,01,02,00,0E
"Reset" Command	01,10,00,08,00,01,02,00,09
Zero Command	01,10,00,08,00,01,02,00,01
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
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

14.CANOPEN (ONLY **FT-10 FLOW CO**)

After setting related parameters you can communicate with the controller via CANopen network. EDS file is available on CD which is supplied together with the instrument or on internet 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 (Only FT-10 FILL CO)

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

[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 FILL will be entered via keypad between 001 to 126.

There are 2 LED's near the CANopen connector which are;
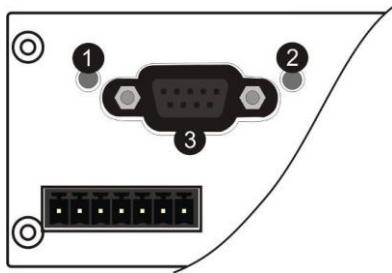
1	Run LED
2	Error LED
3	CANopen interface

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.

14.1 Data Format

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

14.2 EDS Configuration

CANopen data structures of FT-10 FLOW CO includes 1 x TxPDO (64 bit) and 1 x RxPDO (64 bit). EDS configuration for PLC programmers is shown in Figure 14.1.
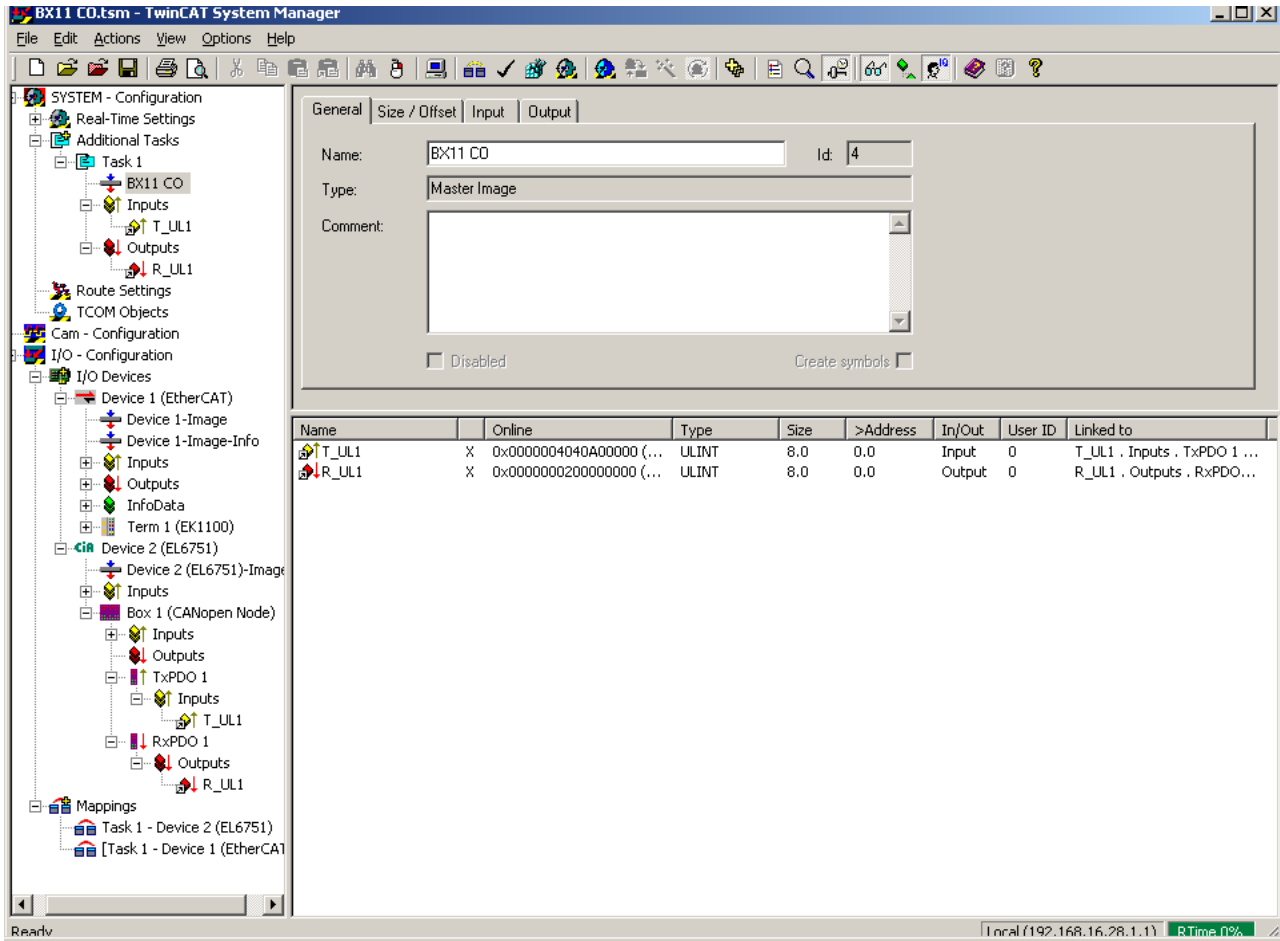
Figure 14.1 - EDS Configuration

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

14.3 CANopen Data Structure

FT-10 FLOW 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)			Out 5	Out 4	Out 3	Out 2	Out 1				In 4	In 3	In 2	In 1
	Error codes of FT-10 FLOW CO				Process Error		Zero range	Gross Net	MD	Read command response				Cmd Flg
	By default, Actual weight value is represented. To represent other weight or calibration status, refer to D33…D37.													

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

Bit Number	TxPDO 1 (T_UL1) Description			
D63 … D56	Outputs	Output bit status (Active = 1)		
D55 … D48	Inputs	Input bit status (Active = 1)		
D47 … D44	Error Codes of FT-10 FLOW CO	Bin	Dec	Descriptions
		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	Not in use			
D42	Process Error	0		No error
		1		Process error (Check the 'Process error messages')
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	Bin	Dec	Descriptions
		00000	0	Actual weight (Net if the indication is in Net)
		00001	1	Gross weight
		00010	2	Tare weight
		00011	3	Calibration Status (Refer to Table 14.2)

		00100	4	Not used
		01110	14	
		01111	15	Total-3 (Non-erasable total)
		10000	16	Not used
		10001	17	Target value
		10010	18	Not used
		10011	19	Coarse value
		10100	20	Not used
		10101	21	Fine value
		10110	22	Label number (CN) (Always integer)
		10111	23	Last filling value
		11000	24	Quantity (Always integer)
		11001	25	Total-1 (Erasable total)
		11010	26	Total-2 (The current day's total)
		11011	27	Total-4 (Yesterday's total)
		11100	28	Ton / hour indication (The actual flow rate)
		11101	29	24 hours indication (Estimated daily total)
		11110	30	Process error messages (Refer to Table 14.1)
		11111	31	Use the Expanded Command list (Refer to Table 14.3)
D32	CMD Flag	Toggles		The command is applied successfully
D31…D0	By default, Actual weight value is represented. To represent other weight or calibration status, refer to D33~D37.			

Process error messages (always 32 bit integer)

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

Bit Number	Low Dword of TxPDO 1 (T_UL1) Description			
D31 … D16	Not in use			
D15 … D8	Process State	Bin	Dec	Process state
		00000000	0	No process (Adc out, Over, Under etc.)
		00000001	1	Ready
		00000010	2	In filling process
		00000011	3	End of filling (FULL)
		00000100	4	In discharging process
		00000101	5	Delay of flow rate control ([d_tonh] message)
D7 ... D0	Process warning Messages	Bin	Dec	Messages
		00000000	0	No process error
		00000001	1	END
		00000010	2	BY-PASS
		00000011	3	NO FEED
		00000100	4	RESET
	Process error Messages	10000000	128	E GATE
		10000001	129	Not used
		10000111	135	
		10001000	136	E FEED

Table 14.1– Process error messages

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 FLOW CO Input'.

Bit Number	Low Dword of TxPDO 1 (T_UL1) Description			
D31 … D16	Not in use			
D15 … D8	Calibration Errors	Bin	Dec	Commands
		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 FLOW 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 14.2 - Calibration status

PLC Output to FT-10 FLOW 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)	Not used	SFE	Reset	Filling Start	BY-PASS	Not used	Expanded Commands List
	Not used				Command List		Read Data Selection	New CMD
	D33~D37 bits defines the usage of this Dword.						

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

Bit Number	RxPDO 1 (R_UL1) descriptions		
D63 … D62	Not used		
D61	Start for emptying (SFE)	A transition form 0 to1 activates the "Start for emptying" command.	
D60	Reset	A transition form 0 to1 activates the "Reset" command.	
D59	Start for filling	A transition form 0 to1 activates the "Start for filling" command.	
D58	By-Pass	A transition from 0 to1 activates the by-pass function and transition from 1 to 0 deactivates the by-pass function.	
D57 … D56	Not used		
D55 … D48	Expanded Commands List (Refer to Table 14.3)		
D47 ... D43	Not used		
D42 … D38	Command List	**Bin** / **Dec** / **Commands**	

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
01000	8	Average mV/V value [1]	
01001	9	Dead Load value [1]	
01010	10	Save the coefficients of eCal	Refer to par. [313]
01011 / 10000	11 / 16	Not used	
10001	17	Target value [1]	
10010	18	Not used	
10011	19	Coarse value [1]	
10100	20	Not used	
10101	21	Fine value [1]	

		10110	22	Label number (CN) (Always integer) [1]
		10111	23	Not used
		11000	24	Quantity (Always integer) [1]
		11001	25	Total-1 [1] (Erasable total)
		11010	26	Not used
		11110	30	
		11111	31	Use the Expanded Command list (Refer to Table 14.3)
D37 ... D33	Read Data Selection	00000	0	Actual weight (Net if the indication is in Net)
		00001	1	Gross weight
		00010	2	Tare weight
		00011	3	Calibration Status (Refer to Table 14.2)
		00100	4	Not used
		01110	14	
		01111	15	Total-3 (Non-erasable total)
		10000	16	Not used
		10001	17	Target value
		10010	18	Not used
		10011	19	Coarse value
		10100	20	Not used
		10101	21	Fine value
		10110	22	Label number (CN) (Always integer)
		10111	23	Last filling value
		11000	24	Quantity (Always integer)
		11001	25	Total-1 (Erasable total)
		11010	26	Total-2 (The current day's total)
		11011	27	Total-4 (Yesterday's total)
		11100	28	Ton / hour indication (The actual flow rate)
		11101	29	24 hours indication (Estimated daily total)
		11110	30	Process error messages (Refer to Table 14.1)
		11111	31	Use the Expanded Command list (Refer to Table 14.3)
D34	New CMD	Toggle		Apply commands which are listed in this table
D33~D0	D33~D37 bits defines the usage of this Dword.			

(1) Write this command with writing values to D0…D33 bits then apply New CMD.

Expanded Command List (always 32 bit integer)

Here TxPDO 1 (T_UL1) is the data receiving from PLC and the "D48 … D55" bits describes below.

Bit No	Description	Binary	Dec	R/W	Commands		
		00000000	0	R	Voltage of Power Supply	Voltage of power supply is indicated with 0.1 VDC increment.	
		00000001 00011111	1 31	Not in use			
				R/W	Application Parameters [1]		
		00100000	32	R/W	D_DISC	End of emptying delay	
		00100001	33	R/W	D_GATE	Gate control delay	
		00100010	34	R/W	ZERO_R	Zero range	
		00100011	35	R/W	T_TRGT	Total target	
		00100100	36	R/W	TON_HR	Flow rate	
		00100101	37	R/W	S_QTY	Sampling Quantity	
		00100110	38	R/W	GAT_CH	Gate position check	
		00100111 00111111	39 63	Not used			
		01000000	64	RW	Filter [1]	Refer to par. [120], page 32	
D48…D55	Expanded Commands List	01000001	65	Not used			
		01000010	66	RW	Zeroing Range [1]	Refer to par. [203], page 33	
		01000011	67	RW	Auto Zero Tracking [1]	Refer to par. [204], page 33	
		01000100	68	Not used			
		01000101	69	RW	Motion Detector [1]	Refer to par. [206], page 33	
		01000110 01000111	70 71	Not used			
		01001000	72	RW	Capacity [1]	Refer to par. [212], page 33	
		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
		01001011 01100000	75 96	Not Used			
		01100001	97	R/W	Feeding type [1]	Refer to par. [501], page 44	
		01100010	98	R/W	Preact correction factor [1]	Refer to par. [502], page 44	
		01100011	99	R/W	Not used		
		01100100	100	R/W	Check delay [1]	Refer to par. [504], page 44	

		01100101	101	R/W	Zeroing period [1]	Refer to par. [505], page 44
		01100110	102	R/W	Zeroing delay [1]	Refer to par. [506], page 44
		01100111	103	R/W	Ind. at the end of filling [1]	Refer to par. [507], page 44
		01101000	104	R/W	Feeding check time [1]	Refer to par. [508], page 44
		01101001	105	R/W	Maximum filling weight [1]	Refer to par. [509], page 44

Table 14.3 - Expanded Command List

(1) Write this command with writing values to D0~D33 bits then apply New CMD.

Programming steps of frequent used ……

Reading a weight value:

1. Check the D43…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.

15. ETHERNET/IP (ONLY FT-10 FLOW EI)

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

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 is available on CD which is supplied together with the instrument or on internet www.flintec.com .

There are 4 announcement LEDs on the instrument to indicate the interface status as seen below. The meanings of these LED's are;
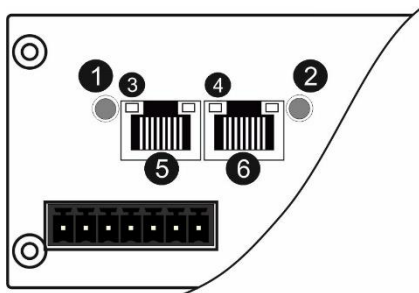
1	NS Network Status LED
2	MS Module Status LED
3	Link/Activity LED (port 1)
4	Link/Activity LED (port 2)
5	P1 interface (port 1)
6	P2 interface (port2)

NS Network Status LED

LED State	Description
Off	Not IP address
Green	Online, one or more connections established (CIP Class 1 or 3)
Green, flashing	Online, no connections established
Red	Duplicate IP address, FATAL error
Red, flashing	One or more connections timed out (CIP Class 1 or 3)

MS Module Status LED

LED State	Description
Off	No power
Green	Controlled by a scanner in run state
Green, flashing	Not configured, or scanner in idle state
Red	Major fault (EXCEPTION state, FATAL error etc.)
Red, flashing	Recoverable fault(s)

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

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)

15.1 Data Format

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

15.2 EtherNet/IP Parameters

There are 7 parameters for EtherNET/IP network and EtherNET/IP set up is done by IndFace1x (EtherX PC) software over Local Network Area as described in this section. EtherX PC software is available in CD which is supplied together with the instrument or on internet 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 ' '.

15.3 EDS Configuration

EtherNet/IP data structures of FT-10 FLOW includes 2 x Input 2 words and 2 x Output 2 words. EDS configuration for PLC programmers is shown in **Figure 15.1** and **Figure 15.2**.
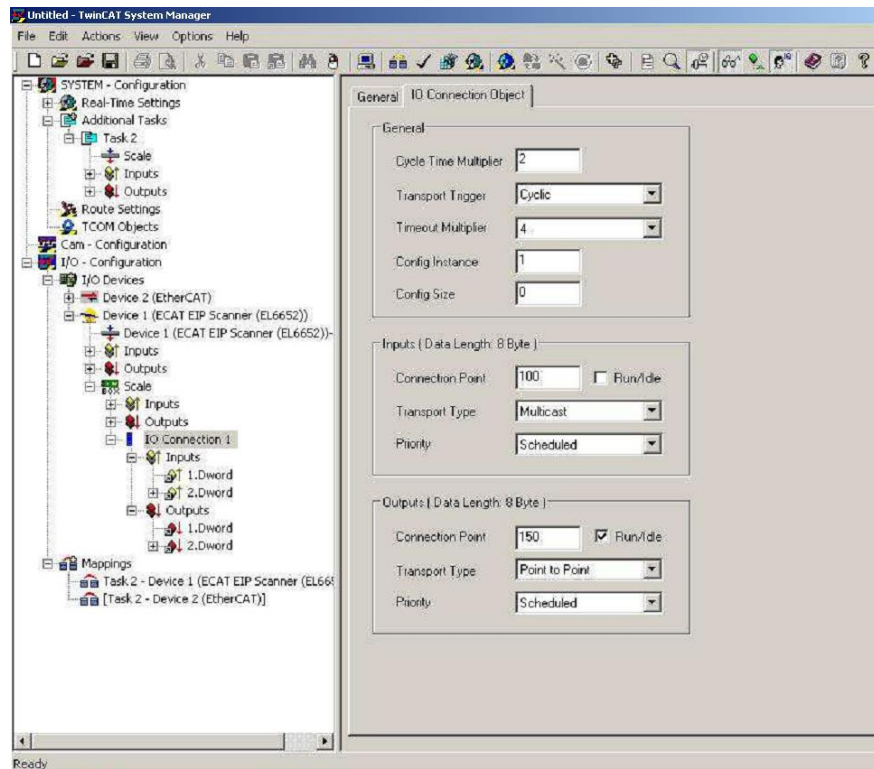
Figure 15.1 – Configuration of module properties without EDS file
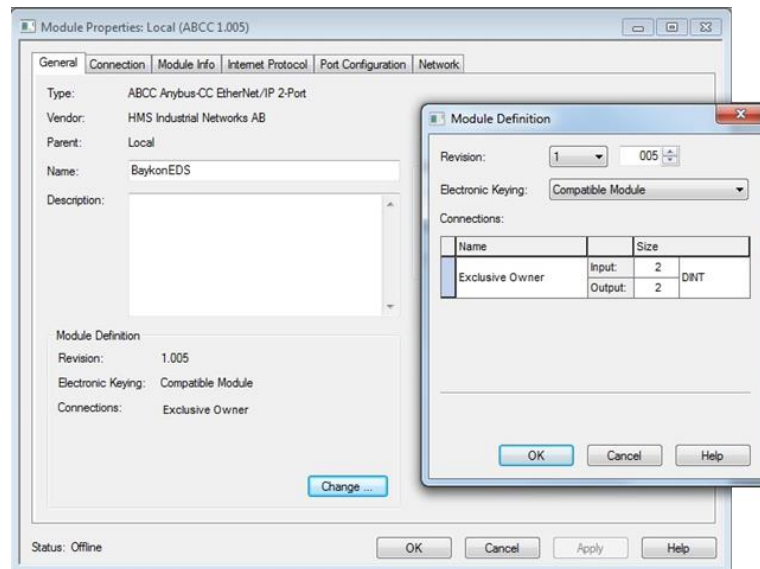
Figure 15.2 – Configuration of module properties with EDS file

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

15.4 EtherNet/IP, EtherCAT, CC-Link Data Structure

FT-10 FLOW 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, Actual weight value is represented. To represent other weight or calibration status, refer to next Dword.														
2nd Dword				Out 5	Out 4	Out 3	Out 2	Out 1					In 4	In 3	In 2	In 1
	Error codes of FT-10 FLOW					Process Error		Zero range	Gross Net	MD	Read command response					Cmd Flg

FT-10 FLOW Output to PLC Input 2nd Dword

Bit Number	2nd Dword Description			
D31 … D24	Outputs	Output bit status (Active = 1)		
D23 … D16	Inputs	Input bit status (Active = 1)		
D15 … D12	Error Codes of FT-10 FLOW	**Bin**	**Dec**	**Descriptions**
		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	Not in use			
D10	Process Error	0		No error
		1		Process error (Check the 'Process error messages´)
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	Actual weight (Net if the indication is in Net)
		00001	1	Gross weight
		00010	2	Tare weight
		00011	3	Calibration Status (Refer to Table 11.2)
		00100 / 01110	4 / 14	Not used
		01111	15	Total-3 (Non-erasable total)
		10000	16	Not used
		10001	17	Target value
		10010	18	Not used
		10011	19	Coarse value

		10100	20	Not used
		10101	21	Fine value
		10110	22	Label number (CN) (Always integer)
		10111	23	Last filling value
		11000	24	Quantity (Always integer)
		11001	25	Total-1 (Erasable total)
		11010	26	Total-2 (The current day's total)
		11011	27	Total-4 (Yesterday's total)
		11100	28	Ton / hour indication (The actual flow rate)
		11101	29	24 hours indication (Estimated daily total)
		11110	30	Process error messages (Refer to Table 11.1)
		11111	31	Use the Expanded Command list (Refer toTable 11.3)
D0	CMD Flag	Toggles		The command is applied successfully

Process error messages (always 32 bit integer)

1st Dword descriptions when read command is 'Process error messages'. Refer to 2nd Dword of PLC Output to FT-10 FLOW Input

Bit Number	1st Dword Description			
D31 … D16	Not in use			
D15 … D8	Process State	**Bin**	**Dec**	**Process state**
		00000000	0	No process (Adc out, Over, Under etc.)
		00000001	1	Ready
		00000010	2	In filling process
		00000011	3	End of filling (FULL)
		00000100	4	In discharging process
		00000101	5	Delay of flow rate control ([d_tonh] message)
D7 ... D0	Process warning Messages	**Bin**	**Dec**	**Messages**
		00000000	0	No process error
		00000001	1	END
		00000010	2	BY-PASS
		00000011	3	NO FEED
		00000100	4	RESET
	Process error Messages	10000000	128	E GATE
		10000001	129	Not used
		10000111	135	
		10001000	136	E FEED

Table 15.1– Process error messages

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 FLOW Input

Bit Number	1st Dword Description			
D31 … D16	Not in use			
D15 … D8	Calibration Errors	**Bin**	**Dec**	**Commands**
		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 1st Dword of PLC Output to FT-10 FLOW PB 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 15.2 - Calibration status

PLC Output to FT-10 FLOW 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		SFE	Reset	Filling Start	BY-PASS	Not in use	Expanded Commands List		
	Not in use			Command List		Read Data Selection			New CMD

PLC Output to FT-10 FLOW Input 2nd Dword

Bit Number	2rd Dword descriptions				
D31 … D30	Not used				
D29	Start for emptying (SFE)	A transition form 0 to1 activates the "Start for emptying" command.			
D28	Reset	A transition form 0 to1 activates the "Reset" command.			
D27	Start for filling	A transition form 0 to1 activates the "Start for filling" command.			
D26	By-Pass	A transition from 0 to1 activates the by-pass function and transition from 1 to 0 deactivates the by-pass function.			
D25 … D24	Not used				
D23 … D16	Expanded Commands List (Refer to Table 11.3)				
D15 … D11	Not in use				
		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)]	
D10 … D6	Command List	01010	10	Save the coefficients of eCal	
		01011 / 10000	11 / 16	Not used	
		10001	17	Target value [1]	
		10010	18	Not used	
		10011	19	Coarse value [1]	
		10100	20	Not used	
		10101	21	Fine value [1]	
		10110	22	Label number (CN) (Always integer) [1]	
		10111	23	Not used	
		11000	24	Quantity (Always integer) [1]	
		11001	25	Total-1 [1] (Erasable total)	
		11010 / 11110	26 / 30	Not used	
		11111	31	Use the Expanded Command list (Refer to Table 11.3)	
		00000	0	Actual weight (Net if the indication is in Net)	
		00001	1	Gross weight	
		00010	2	Tare weight	
D5 ... D1	Read Data Selection	00011	3	Calibration Status (Refer to Table 11.2)	
		00100 / 01110	4 / 14	Not used	
		01111	15	Total-3 (Non-erasable total)	

		10000	16	Not used
		10001	17	Target value
		10010	18	Not used
		10011	19	Coarse value
		10100	20	Not used
		10101	21	Fine value
		10110	22	Label number (CN) (Always integer)
		10111	23	Last filling value
		11000	24	Quantity (Always integer)
		11001	25	Total-1 (Erasable total)
		11010	26	Total-2 (The current day's total)
		11011	27	Total-4 (Yesterday's total)
		11100	28	Ton / hour indication (The actual flow rate)
		11101	29	24 hours indication (Estimated daily total)
		11110	30	Process error messages (Refer to Table 11.1)
		11111	31	Use the Expanded Command list (Refer to Table 11.3)
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

Expanded Command List (always 32 bit integer)

Here 1st Dword is the data receiving from PLC and the "D23 … D16" bits describes below.

Bit No	Description	Bin	Dec	R/W	Commands	
		Bin	**Dec**	**R/W**	**Commands**	
		00000000	0	R	Voltage of Power Supply	Voltage of power supply is indicated with 0.1 VDC increment.
		00000001 00011111	1 31	Not in use		
					Application Parameters [1]	
		00100000	32	R/W	D_DISC	End of emptying delay
		00100001	33	R/W	D_GATE	Gate control delay
		00100010	34	R/W	ZERO_R	Zero range
		00100011	35	R/W	T_TRGT	Total target
		00100100	36	R/W	TON_HR	Flow rate
		00100101	37	R/W	S_QTY	Sampling Quantity
		00100110	38	R/W	GAT_CH	Gate position check
		00100111 00111111	39 63	Not used		
		01000000	64	R/W	Filter [1]	Refer to par. [120], page 32
		01000001	65	Not used		
		01000010	66	R/W	Zeroing Range [1]	Refer to par. [203], page 33
		01000011	67	R/W	Auto Zero Tracking [1]	Refer to par. [204], page 33
		01000100	68	Not used		
		01000101	69	R/W	Motion Detector [1]	Refer to par. [206], page 33
D23…D16	Expanded Commands List	01000110 01000111	70 71	Not used		
		01001000	72	R/W	Capacity [1]	Refer to par. [212], page 33
		01001001	73	R/W	Decimal point [1]	0 XXXXOO
						1 XXXXXO
						2 XXXXXX
						3 XXXXX.X
						4 XXXX.XX
						5 XXX.XXX
		01001010	74	R/W	Increment [1]	1 X1
						2 X2
						3 X5
		01001011 01100000	75 96	Not Used		
		01100001	97	R/W	Feeding type [1]	Refer to par. [501], page 44
		01100010	98	R/W	Preact correction factor [1]	Refer to par. [502], page 44
		01100011	99	R/W	Not used	
		01100100	100	R/W	Check delay [1]	Refer to par. [504], page 44
		01100101	101	R/W	Zeroing period [1]	Refer to par. [505], page 44
		01100110	102	R/W	Zeroing delay [1]	Refer to par. [506], page 44
		01100111	103	R/W	Ind. at the end of filling [1]	Refer to par. [507], page 44
		01101000	104	R/W	Feeding check time [1]	Refer to par. [508], page 44
		01101001	105	R/W	Max.filling weight [1]	Refer to par. [509], page 44

Table 15.3 - 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:

3. Check the D11…D15 bits of 'FT-10 FLOW PB Output to PLC Input 2nd Dword'.
4. If there is not any error, read a weight value (gross, net or tare),

Zero Calibration procedure:

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

Span Calibration procedure:

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

16. ETHERCAT (ONLY FT-10FLOW EC)

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

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 port EtherCAT is available on CD which is supplied together with the instrument or on internet www.flintec.com .

There are 4 announcement LEDs on the instrument to indicate the interface status as seen below. The meanings of these LED's are;
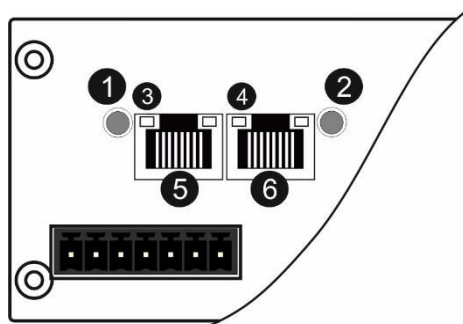
1	NS RUN LED
2	MS ERR LED
3	Link/Activity (IN port)
4	Link/Activity (OUT port)
5	EtherCAT (IN port)
6	EtherCAT (OUT port)

NS RUN LED

LED State	Description
Off	INIT
Green	OPERATIONAL
Green, blinking	PRE-OPERATIONAL
Green, single flash	SAFE-OPERATIONAL
Red	(Fatal Event)

MS ERR LED

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

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

LINK/Activity LED

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

16.1 Data Format

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

16.2 ESI Configuration

EtherCAT data structures of FT-10FLOW includes 2 x Input 2 words and 2 x Output 2 words. ESI configuration for PLC programmers is shown in **Figure 16.1**.
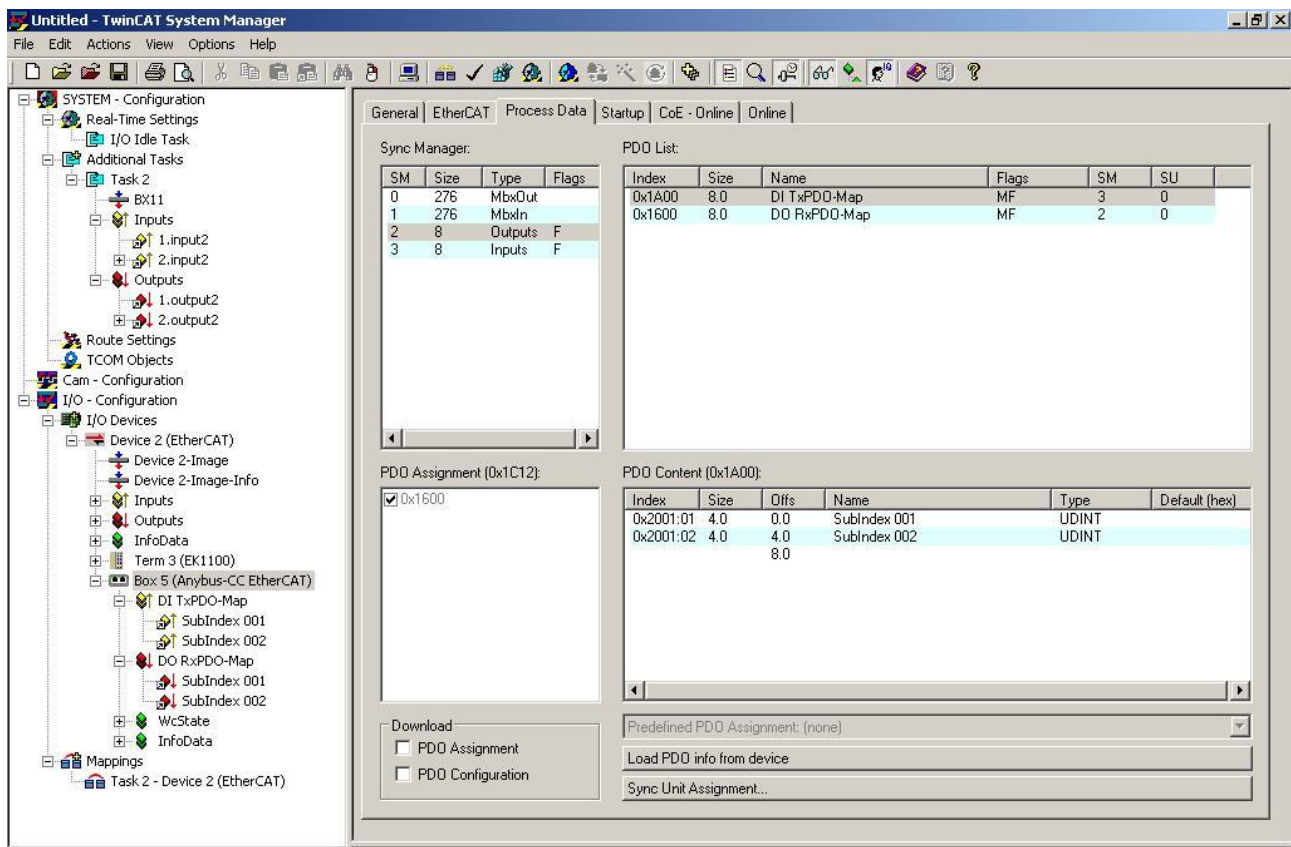
Figure 16.1 – Configuration of module properties for Beckhoff

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

16.3 EtherCAT Data Structure

EtherCAT Data Structur is the same as EtherNET/IP Data Structure. This can be found on page 88

17. CC-LINK (ONLY FT-10FLOW 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.

There are 2 LED's near the CC-Link connector which are;
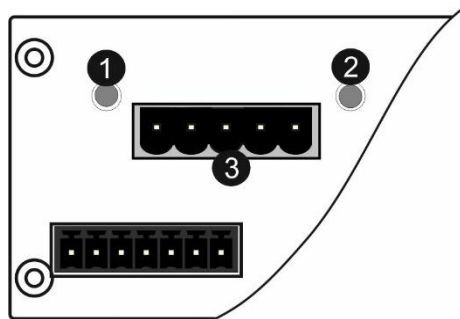
1	NS RUN LED
2	MS ERR LED
3	CC-Link interface

NS Run LED

State	Indication
Off	No network participation, timeout status (no power)
Green	Participating, normal operation
Red	Major fault (FATAL error)

MS Error LED

State	Indication
Off	No error detected (no power)
Red	Major fault (Exception or FATAL event)
Red, flickering	CRC error (temporary flickering)
Red, flashing	Station Number or Baud rate has changed since startup (flashing)

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

17.1 Data Format

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

17.2 CC-Link Configuration

FT-10Flow CC has one occupied station area on CC-Link network and station type of FT-10Flow must be programmed as 'Remote device station' in the PLC software. CC-Link configuration for PLC programmers is shown in **Figure 17.1**.

Figure 17.1 – Station information

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

17.3 CC-Link Data Structure

CC-Link Data Structur is the same as EtherNET/IP Data Structure. This can be found on page 88

18. SEALING FOR APPROVED SCALE

Label sealing

Load cell connector and housing sealing

Load cell connector and housing sealing
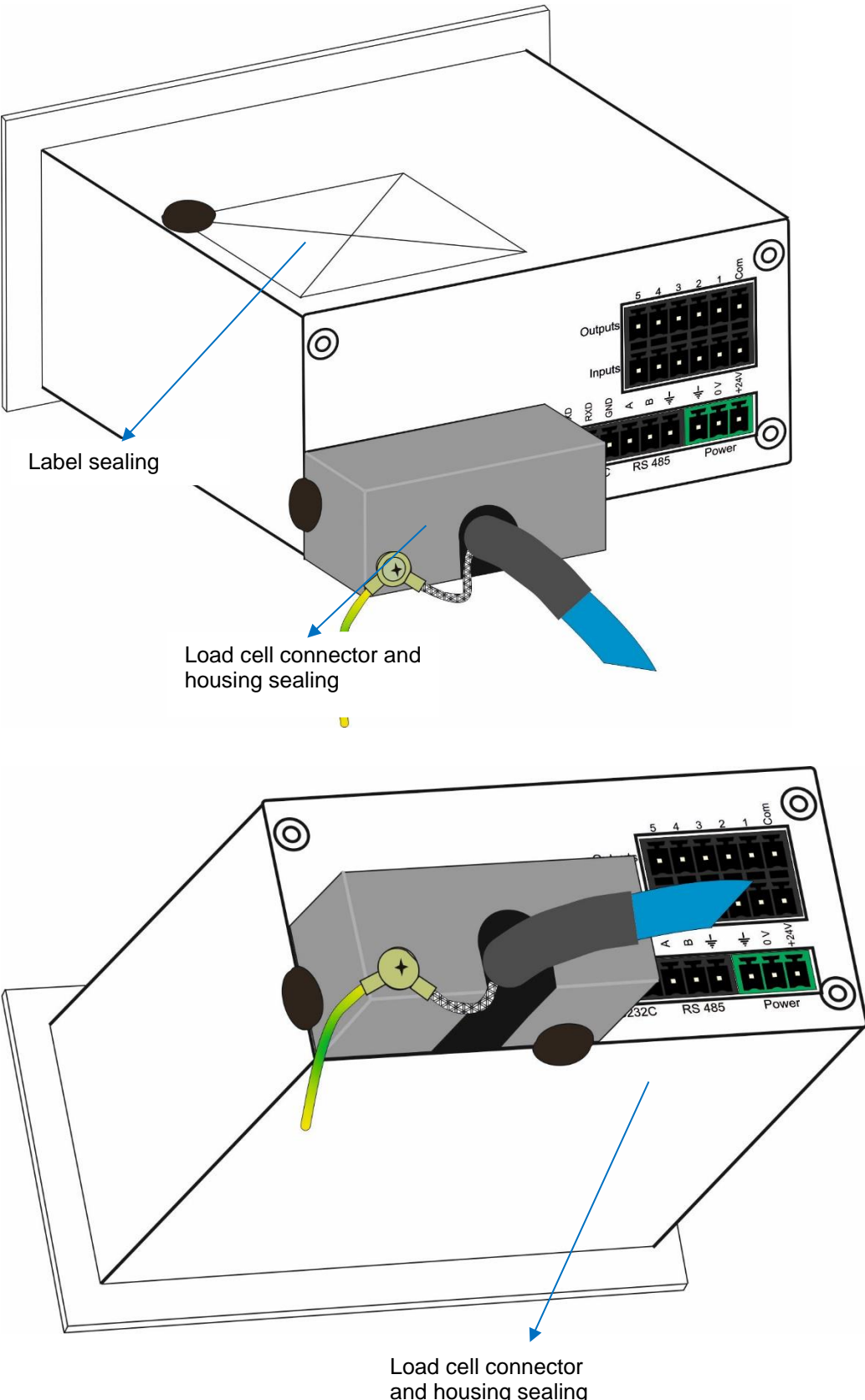
19. TROUBLE SHOOTING

FT-10 FLOW filling controller has 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 problem you have with your instrument and the error messages shown on the display. Then try to solve the problem according to the error table below.

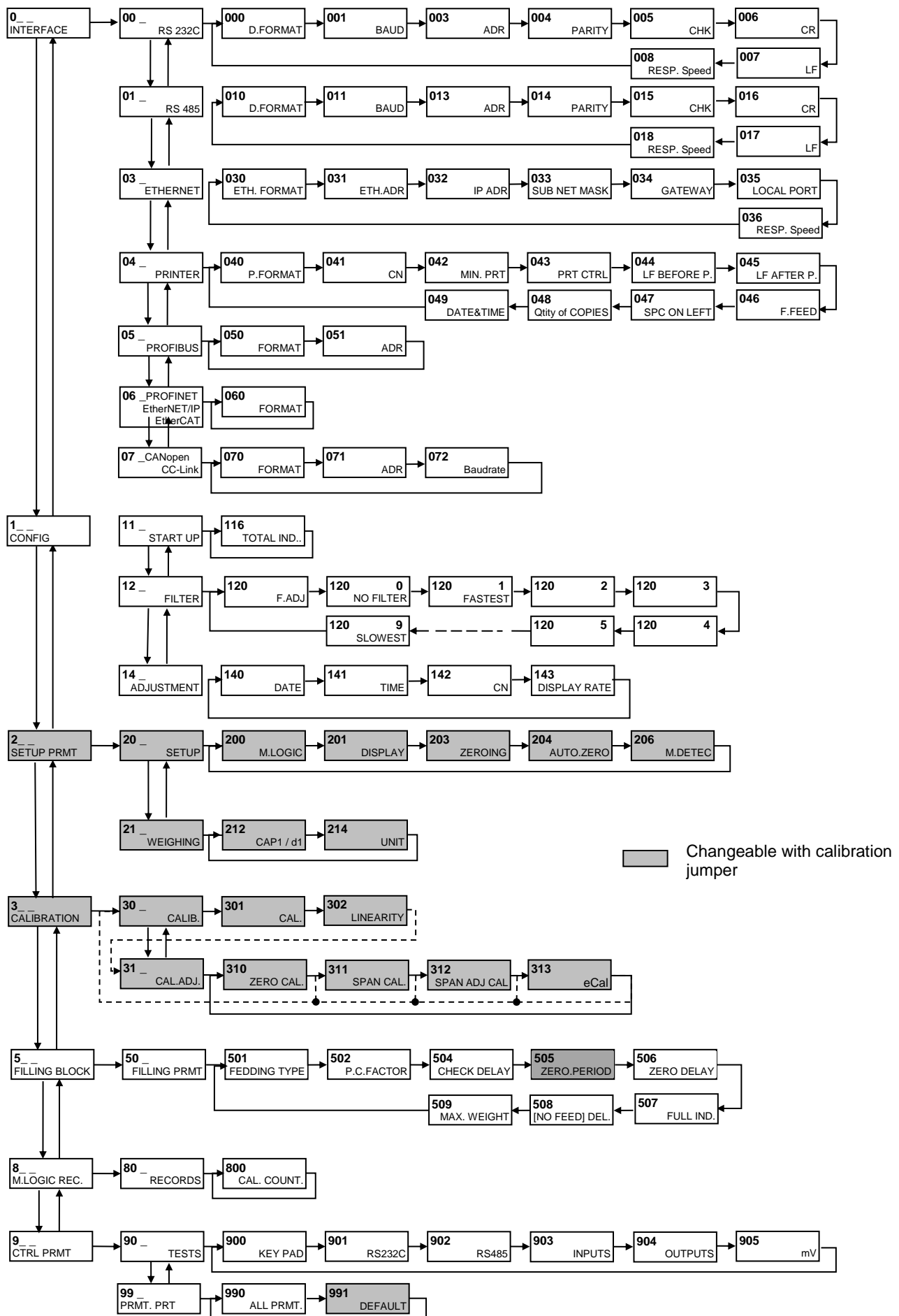| ERROR CODE	DESCRIBTION	THINGS TO DO
Under	Weight is too low	- Check the load - Load cell or instrument could be broken.
Over	Over Load	
ADC Out	Load exceeds the operation range	- Check the load - Check the calibration - Load cell or instrument could be broken.
Err 1	ADC error	- Re-energize indicator - Call FLINTEC
Err 2	ADC error	- Re-energize indicator - Call FLINTEC
Err 3	Indicator cannot be calibrating	- 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 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 board info error	- Call FLINTEC
Err 61	EEPROM is not installed or broken	- 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

20.PARAMETER DEFAULT TABLE

0--	Interface Block		14-	Entries	
00-	RS 232C		140	Date	
000	Data Format	3 = BSI	141	Time	
001	Baud rate	3 = 9600	142	Label No entrance	
003	Address	0	143	Display refresh rate	1 = 100ms
004	Data length and Parity	0 = 8 bit, no parity	2--	Scale Block	
005	Checksum	0 = Disable	20-	Set up	
006	Carriage Return	1 = Enable	200	Approved	0 = No
007	Line Feed	1 = Enable	201	Increased indication	0 = x10 key
008	Response Speed	0 = immediately	203	Zero range	3 = ± %50
01-	RS 485		204	Auto zero tracking	0 = Disable
010	Data Format	5 = Modbus RTU Lo-Hi **	206	Motion detector	2 = ± 1e
011	Baud rate	3 = 9600	21-	Scale Build	
013	Address	1	212	Capacity / d	60 kg / 0.01 kg
014	Data length and Parity	0 = 8 bit, no parity	214	Unit	0 = kg
015	Checksum	0 = Disable	3--	Calibration Block	
016	Carriage Return	1 = Enable	30-	Calibration	
017	Line Feed	1 = Enable	301	Calibration	
018	Response Speed	0 = immediately	302	Linearity Correction	
03-	Ethernet		31-	Adjustment	
030	Ethernet Data Format	5 = Modbus RTU Lo-Hi	310	Zero adjustment	
031	Ethernet Address	1	311	Span adjustment	
032	IP Address	192.168.016.250	312	Span adjustment under load	
033	Subnet Mask	255.255.255.000	313	eCal Calibration	
034	Gateway Address	192.168.016.253	5--	Filling Block	
035	Local Port	502	50-	Filling Parameters	
036	Response Speed	0 = immediately	501	Feeding type	1
04-	Printer		502	Preact correction factor	50%
040	Print out format	2 = Multi line	504	Check delay	1.0 sec.
041	CN	1 = Will be printed	505	Zeroing period	250 sec.
042	Minimum print	20	506	Zeroing delay	2.0 sec.
043	Print method	0 = With Print Key	507	Indication at the end of filling	0
044	Line feed before printing	00 = 0 F + 0 LF	508	Feeding check delay	100
045	Line feed after printing	04 = 0 F + 2 LF	509	Maximum filling weight	999999
046	Form feed	0 = Disable	8--	Metrological Data Block	
047	Space on the left	3	80-	Legal Metrology	
048	Quantity of copies	1	800	Calibration counter	
049	Date&Time	0 = Disable	9--	Diagnostic	
05-	Profibus DP		90-	Tests	
050	Data Format	0 = signed 32 bit	900	Key Pad testing	
051	Rack Address	0	901	RS 232C testing	
06-	Profinet, EtherNET/IP, EtherCAT		902	RS 485 testing	
060	Data Format	0 = signed 32 bit	903	Parallel inputs test	
07-	CANopen, CCLink		904	Parallel outputs test	
070	Data Format	0 = signed 32 bit	905	mV indication	
071	Rack Address	0	99-	Printing Parameters	
072	Baudrate	0 = 156 kbps			
1--	Configuration Block		990	Whole parameters	
11-	Start-Up		991	Load default parameters	
116	Total indication	0 = Total-1			
12-	Filter				
120	Filter	7			

** Except for FT-10 Flow EN

21. SETUP AND CALIBRATION MENU

0 _ _ INTERFACE

00 _ RS 232C → **000 D.FORMAT** → **001 BAUD** → **003 ADR** → **004 PARITY** → **005 CHK** → **006 CR** → **007 LF** → **008 RESP. Speed**

01 _ RS 485 → **010 D.FORMAT** → **011 BAUD** → **013 ADR** → **014 PARITY** → **015 CHK** → **016 CR** → **017 LF** → **018 RESP. Speed**

03 _ ETHERNET → **030 ETH. FORMAT** → **031 ETH.ADR** → **032 IP ADR** → **033 SUB NET MASK** → **034 GATEWAY** → **035 LOCAL PORT** → **036 RESP. Speed**

04 _ PRINTER → **040 P.FORMAT** → **041 CN** → **042 MIN. PRT** → **043 PRT CTRL** → **044 LF BEFORE P.** → **045 LF AFTER P.** → **046 F.FEED** → **047 SPC ON LEFT** → **048 Qtity of COPIES** → **049 DATE&TIME**

05 _ PROFIBUS → **050 FORMAT** → **051 ADR**

06 _ PROFINET EtherNET/IP EtherCAT → **060 FORMAT**

07 _ CANopen CC-Link → **070 FORMAT** → **071 ADR** → **072 Baudrate**

1 _ _ CONFIG

11 _ START UP → **116 TOTAL IND..**

12 _ FILTER → **120 F.ADJ** → **120 0 NO FILTER** → **120 1 FASTEST** → **120 2** → **120 3** → **120 4** → **120 5** → **120 9 SLOWEST**

14 _ ADJUSTMENT → **140 DATE** → **141 TIME** → **142 CN** → **143 DISPLAY RATE**

2 _ _ SETUP PRMT

20 _ SETUP → **200 M.LOGIC** → **201 DISPLAY** → **203 ZEROING** → **204 AUTO.ZERO** → **206 M.DETEC**

21 _ WEIGHING → **212 CAP1 / d1** → **214 UNIT**

Changeable with calibration jumper

3 _ _ CALIBRATION

30 _ CALIB. → **301 CAL.** → **302 LINEARITY**

31 _ CAL.ADJ. → **310 ZERO CAL.** → **311 SPAN CAL.** → **312 SPAN ADJ CAL** → **313 eCal**

5 _ _ FILLING BLOCK

50 _ FILLING PRMT → **501 FEDDING TYPE** → **502 P.C.FACTOR** → **504 CHECK DELAY** → **505 ZERO.PERIOD** → **506 ZERO DELAY** → **507 FULL IND.** → **508 [NO FEED] DEL.** → **509 MAX. WEIGHT**

8 _ _ M.LOGIC REC.

80 _ RECORDS → **800 CAL. COUNT.**

9 _ _ CTRL PRMT

90 _ TESTS → **900 KEY PAD** → **901 RS232C** → **902 RS485** → **903 INPUTS** → **904 OUTPUTS** → **905 mV**

99 _ PRMT. PRT → **990 ALL PRMT.** → **991 DEFAULT**

22. 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)	60000	50000	40000	30000	25000	20000	16000	15000	12000	10000	8000	6000	5000	4000	3000	2500	2400	2000	1000
0,001	60	50	40	30	25	20	16	15	12	10	8	6	5	4	3			2	1
0,002	120	100	80	60	50	40	32	30	24	20	16	12	10	8	6	5		4	2
0,005	300	250	200	150	125	100	80	75	60	50	40	30	25	20	15		12	10	5
0,01	600	500	400	300	250	200	160	150	120	100	80	60	50	40	30	25	24	20	10
0,02	1.200	1.000	800	600	500	400	320	300	240	200	160	120	100	80	60	50	48	40	20
0,05	3.000	2.500	2.000	1.500	1.250	1.000	800	750	600	500	400	300	250	200	150	125	120	100	50
0,1	6.000	5.000	4.000	3.000	2.500	2.000	1.600	1.500	1.200	1.000	800	600	500	400	300	250	240	200	100
0,2	12.000	10.000	8.000	6.000	5.000	4.000	3.200	3.000	2.400	2.000	1.600	1.200	1.000	800	600	500	480	400	200
0,5	30.000	25.000	20.000	15.000	12.500	10.000	8.000	7.500	6.000	5.000	4.000	3.000	2.500	2.000	1.500	1.250	1.200	1.000	500
1	60.000	50.000	40.000	30.000	25.000	20.000	16.000	15.000	12.000	10.000	8.000	6.000	5.000	4.000	3.000	2.500	2.400	2.000	1.000
2	120.000	100.000	80.000	60.000	50.000	40.000	32.000	30.000	24.000	20.000	16.000	12.000	10.000	8.000	6.000	5.000	4.800	4.000	2.000
5	300.000	250.000	200.000	150.000	125.000	100.000	80.000	75.000	60.000	50.000	40.000	30.000	25.000	20.000	15.000	12.500	12.000	10.000	5.000
10	600.000	500.000	400.000	300.000	250.000	200.000	160.000	150.000	120.000	100.000	80.000	60.000	50.000	40.000	30.000	25.000	24.000	20.000	10.000
20			800.000	600.000	500.000	400.000	320.000	300.000	240.000	200.000	160.000	120.000	100.000	80.000	60.000	50.000	48.000	40.000	20.000
50							800.000	750.000	600.000	500.000	400.000	300.000	250.000	200.000	150.000	125.000	120.000	80.000 / 100.000	50.000
100											800.000	600.000	500.000	400.000	300.000	250.000	240.000	200.000	100.000
200														800.000	600.000	500.000	480.000	400.000	200.000

23. SUBJECT INDEX

24. FREQUENTLY ASKED QUESTIONS

Question	:	My PC could not interface with FT-10 FLOW. How can I check the com port?
Answer	:	− Connect the instrument to the PC and run Hyper Terminal. − Check com ports as described in The Diagnostic Test section on Page 37.
Question	:	My PC doesn't have any COM port. How can I connect instrument to my PC?
Answer	:	You can use RS-232 / USB converter for serial interfacing via USB port. And select com port with Connection Settings menu.
Question	:	My PC have a COM port but I can not see COM port in Connection Setting menu. How can I solve that problem?
Answer	:	Another software may be connected to that COM port. Close all applications.
Question	:	My PC could not interface with FT-10 FLOW. How can I check the com ports?
Answer	:	Short circuit your com port RXD and TXD pins. Check if the sending data is received or not by using any terminal software. You may test also FT-10 FLOW com ports as described in The Diagnostic Tests section on Page 37 by short circuiting RXD and TXD terminals.
Question	:	I need very fast interfacing. What is the response delay time of FT-10 FLOW?
Answer	:	FT-10 FLOW response delay is max. 4 milliseconds for weight data. Extremely fast interfacing.
Question	:	What is the external conversion rate of FT-10 FLOW?
Answer	:	Only fast continuous data output rate might be called as an external conversion rate which is depend on the baud rate and data length and up to 85 conversion/second.
Question	:	How can I check Ethernet connection?
Answer	:	− FT-10 FLOW EN has a dummy web page. You can easily open web page with any browser installed on any PC in network.
Question	:	EtherX is searching but it could not find any instrument over Local Network Area.
Answer	:	− Check the Exceptions tap in Windows firewall settings. EtherX should be marked. − Check the firewall of Anti-virus program, If you have.
Question	:	I done crossover connection with FT-10 FLOW EN but EtherX could not find it.
Answer	:	− Check the Internet Protocol (TCP/IP) Properties in Local Area Connection of Windows. IP address blocks and gateway address of FT-10 FLOW and PC should be the same in cross connection.