FT-10Fill

Filling Controller

Technical Manual

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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. INTRODUCTION

2.1 Overview

FT-10 FILL filling controller is used for processing various type filling applications. It has 4 standard filling modes for open container filling and above level bung hole filling and 2 modes for packing machines. The controller has 4 opto-isolated digital input and 5 relay contact outputs.

2.2 Key features

	FT-10 FILL	FT-10 FILL PB	FT-10 FILL PN	FT-10 FILL EN	FT-10 FILL CO	FT-10 FILL EI	FT-10 FILL EC	FT-10 FILL CC	FT-10 FILL PL
1 000 to 999 999 display resolution	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
High internal resolution up to 16 000 000 counts	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Up to 1600 conversion per second	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Serial interface RS 232C	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Serial interface RS 485	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Modbus RTU	Yes	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	
Powerlink interface									Yes
Continuous data output	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fast Continuous data output	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
BSI data interface	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4 digital input and 5 relay contact output	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Error and at zero outputs (non-isolated)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Programmable F key function (total, t/h, Qtity or last filling value)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Auto-zero tracking	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Motion detection	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zeroing and Taring by field bus command	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adaptive digital filter for fast and stable reading	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Electronic calibration (eCal) without test weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Electronic calibration (eCal) over field bus	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zero and Span calibrations over field bus	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zero adjustment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Span adjustment with test weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Span adjustment for filled tanks	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3 point calibration (linearity correction)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8 load cells 350 Ω or 18 load cells 1100 Ω	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
12 to 28 VDC power supply range	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

2.3 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 10 000 increment (Approved); up to 999 999 increment (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:	Taring, zeroing, auto zero tracking, motion detection, increased resolution
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

RS232C	Baud rate	1200 to 115200 baud rate, 8N1 / 7O1 / 7E1 / 8O1 / 8E1
	Response speed:	Up to 4 ms response delay after read/write commands
RS 485	Baud rate	1200 to 115200 baud rate, 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

Application Modes:	
Mode 1:	Open container filling as Gross
Mode 2:	Open container filling as Net
Mode 3:	Bung-Type container filling as Gross
Mode 4:	Bung-Type container filling as Net
Mode 5:	Packing / bagging
Mode 6:	Multicycle packing/bagging
Mode 7	Weigh-in / Weigh-out
Mode 8	Filling into the bag
Digital Inputs and Outputs:	
Digital Inputs	4 opto-isolated digital inputs; 12 to 28 VDC, 10 mA
Digital Outputs	5 free relay contact; 250 VAC or 30 VDC, 1A
Error & Zero range output	U_0~Power supply voltage, 100 mA, Non-isolated transistor outputs

DC Power supply:	
	12 to 28 VDC (max. 300 mA)
Environment and Enclosure:	
Operation temperature	-10°C … +40°C; 85% RH max, non-condensing, -15°C … +55°C non approved, non OIML
Enclosure	Panel type, front panel and rear panel are stainless steel; Aluminum body.
Protection	Front panel IP65

FT-10 FILL 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 FILL 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 FILL 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.
Web client:	Available
Response speed:	Up to 4 ms response delay after read/write commands

FT-10 FILL 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 baud rate 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 FILL 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 FILL 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 FILL 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)

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

2.4 The Front View and Key Functions
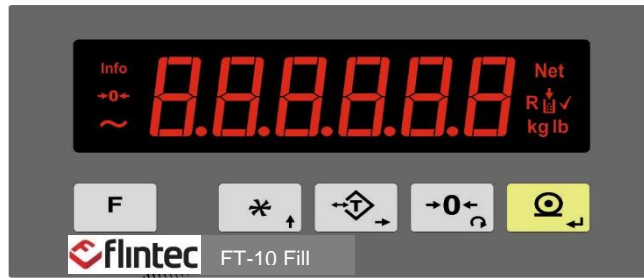
Figure 2.1 - Front panel view of FT-10 FILL

2.4.1 Display

The weight display of FT-10 FILL is seven segments LED. At the right side of the display there are three LED's for indicating the net, process steps and the unit (standard kg).

The meanings of the announcement LED's on the display are:

Info	Announces the Total, filling capacity t/hour, Quantity or last filling value.
→0←	Announces the weight is in the centre of zero.
~	Announces the weight value on the display is unstable.
Net	Announces the indicated value is the net weight.
R	Announces the ready status to start filling process.
🗓	Announces the coarse/fine feedings.
✔	Announces the end of filling.
Units	Kilogram (kg) and libre (lb) units are located on the right of the display.

2.4.2 Key Pad

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

F — **Function:** Key function is programmable to Total, 1/h (ton/hour or klb/hour) indication, Quantity, Last filling value. Refer to parameter [**116**] (Page 33*).

✳ — **Target/Coarse/Fine Menu:** To enter the target (nominal filling value), Coarse lead in and fine lead, press **shortly** this key. Refer to related mode (Page 68).
Mode Related Filling Parameters: To enter the process parameter menu, press **long** this key. Refer to related mode (Page 40).

⬦ — **Tare / Clear:** Pressing this key it tares the scale and get into the Net mode in weighing mode. Press long time to clear the tare.

→0← — **Zeroing:** In Gross mode and Ready state, if the scale doesn't show zero while there is no load on the pan, you can zero the scale by pressing this key.
Reset: If pressing this key in filling or emptying operation, process is cancelled and the instrument returns to the Ready state.

⊙ — **Print:** By pressing this key weight data and other information, depending on the setup parameters, are sent to a printer or a PC via serial port in basic weighing mode.

2.4.3 Key Lock

FT-10 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.

2.4.4 Housing

FT-10 FILL housings are panel type with stainless steel front and back parts and aluminium body.
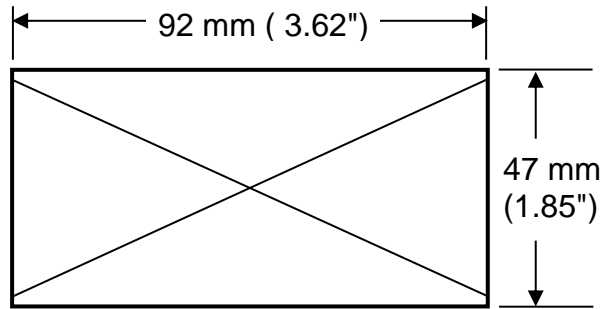
The hole dimensions for mounting FT-10 FILL on the panel
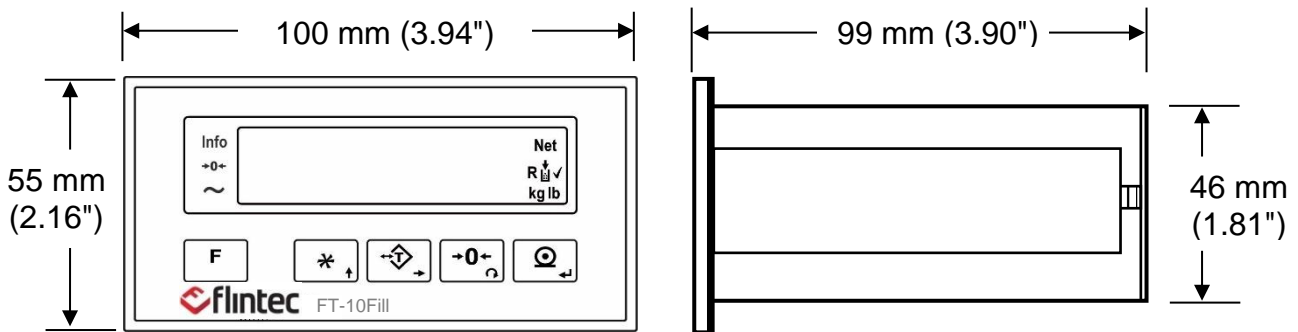
FT-10 FILL front and side view
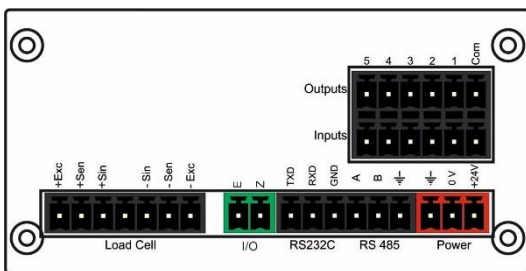
FT-10 FILL Panel type rear view
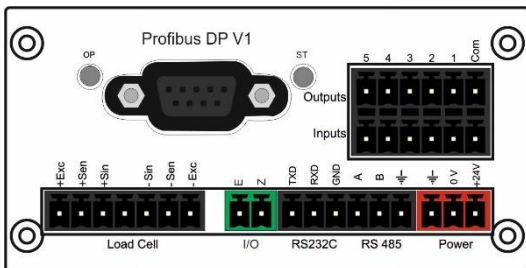
FT-10 FILL PB Panel type rear view
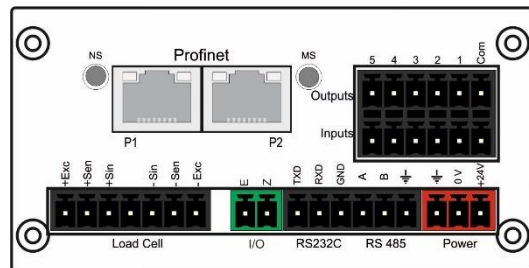
FT-10 FILL PN Panel type rear view
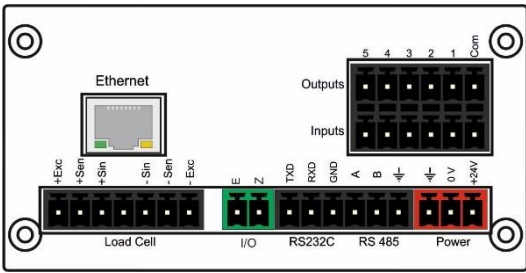
FT-10 FILL EN Panel type rear view

Ethernet

Outputs
Inputs
5 4 3 2 1 Com

+Exc +Sen +Sin -Sin -Sen -Exc
E Z
TXD RXD GND
A B
0 V +24V

Load Cell   I/O   RS232C   RS 485   Power
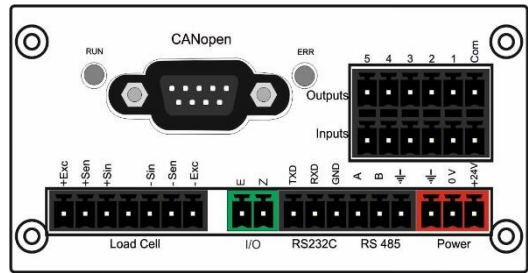
FT-10 FILL CO Panel type rear view

RUN   CANopen   ERR

Outputs
Inputs
5 4 3 2 1 Com

+Exc +Sen +Sin -Sin -Sen -Exc
E Z
TXD RXD GND
A B
0 V +24V

Load Cell   I/O   RS232C   RS 485   Power

FT-10 FILL EI rear view

NS   EtherNet/IP   MS

P1   P2

Outputs
Inputs
5 4 3 2 1 Com

+Exc +Sen +Sin -Sin -Sen -Exc
E Z
TXD RXD GND
A B
0 V +24V

Load Cell   I/O   RS232C   RS 485   Power

FT-10 FILL EC rear view

NS   EtherCAT   MS

P1   P2

Outputs
Inputs
5 4 3 2 1 Com

+Exc +Sen +Sin -Sin -Sen -Exc
E Z
TXD RXD GND
A B
0 V +24V

Load Cell   I/O   RS232C   RS 485   Power
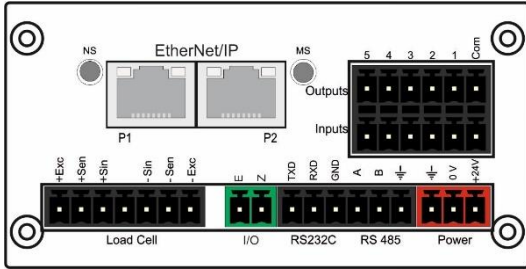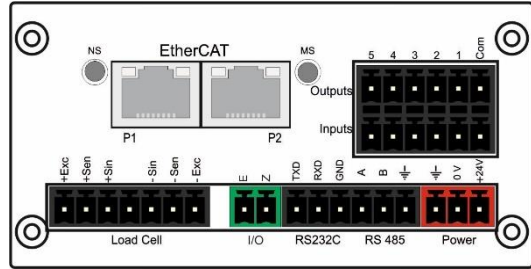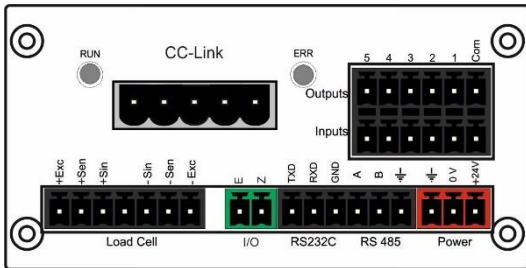
FT-10 FILL CC type rear view

RUN   CC-Link   ERR

Outputs
Inputs
5 4 3 2 1 Com

+Exc +Sen +Sin -Sin -Sen -Exc
E Z
TXD RXD GND
A B
0 V +24V

Load Cell   I/O   RS232C   RS 485   Power
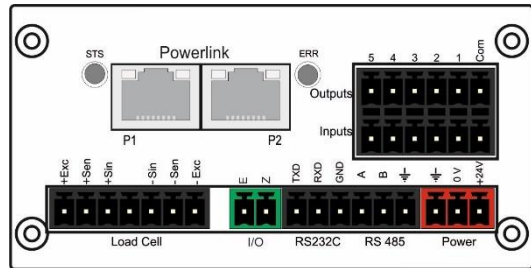
FT-10 FILL PL type rear view

STS   Powerlink   ERR

P1   P2

Outputs
Inputs
5 4 3 2 1 Com

+Exc +Sen +Sin -Sin -Sen -Exc
E Z
TXD RXD GND
A B
0 V +24V

Load Cell   I/O   RS232C   RS 485   Power

3. INSTALLATION

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

3.1 Recommendations

3.1.1 Control Cabinet Design

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

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

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

3.1.2 Cabling

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

3.2 Mechanical Installation

Take care to the housing dimensions and the suggested panel hole dimensions 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.

3.3 Electrical Connections

Warning: Please always remember that FT-10 FILL 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 instrument's 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.

3.3.1 Power Supply Connection and Grounding

Power supply voltage of the instrument shall be between 12 V DC and 28 V DC. The pin configuration of the 24 V DC power supply connector located right - bottom of the instrument is shown in Figure 3.1 below.

The pin layout of the 24 V DC connector of FT-10 FILL Series

(rear view)

PE Protective grounding   Loadcell cable shield
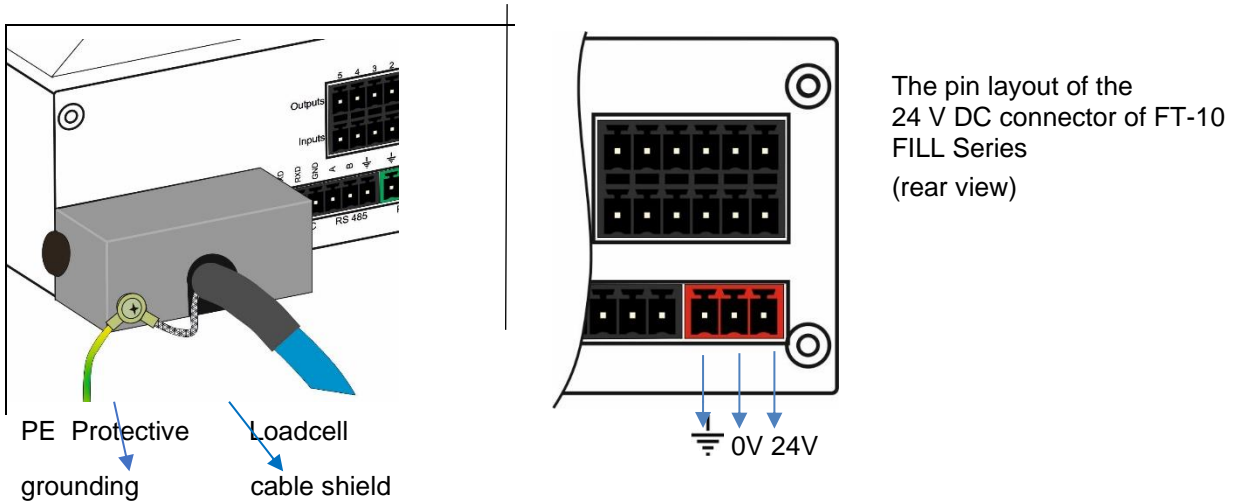
Figure 3.1 **-** The pin layout of 24 V DC connector

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

Before interfering the instrument, turn off the power and wait at least for 30 seconds.

Warning: Connect the Shield pin to the reference ground.

3.3.2 Load Cell Connection

To avoid damages, the load cell wiring should be made carefully before energizing the instrument. Load cell connection detail is shown in Figure 3.2. 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 FILL and the junction box, and short circuit these pins at junction box for better performance.

4 wire Load Cell   ## 6 wire Load Cell
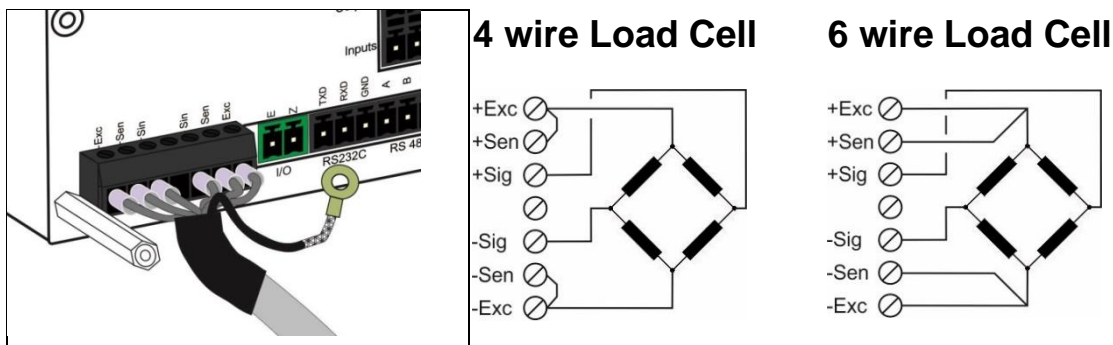
Figure 3.2 **-** Load cell connections

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

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

3.3.3 RS 232C Connection

RS 232C port usage and specifications are shown in the table below and on Page 28.

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 3.1 - RS-232C Serial Interface Specifications

RS 232C serial connection is done with three wires as indicated below in Figure 3.3.
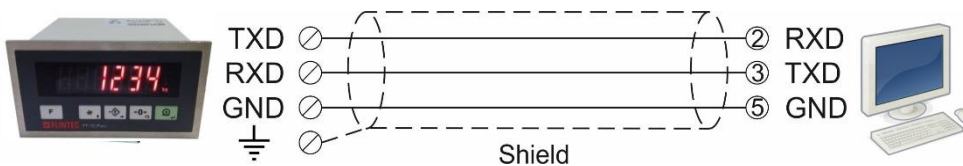
Figure 3.3 - RS 232C serial interface connections

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

3.3.4 RS 485 and Modbus-RTU Connection

RS 485 port usage and specifications are shown in the table below and on Page 29.

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 3.2 - RS 485 Serial Interface Specifications

RS 485 serial connection is done with three wires as indicated below in Figure 3.4. Line termination resistors (110 ohm) are needed at both ends of the RS 485 line.

Figure 3.4 - RS485 serial interface connections

Warning: Connect the shield to the reference ground.

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

3.3.5 Profibus Connection (only FT-10 FILL PB)

Profibus connection is done as indicated below in Figure 3.5.

Figure 3.5 - FT-10 FILL PB serial interface connections

PROFIBUS Connector pin configuration (DB9F)

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

3.3.6 Profinet Connection (only FT-10 FILL PN)

Profinet connection is done as indicated below in Figure 3.6.

Figure 3.6 - FT-10 FILL PN serial interface connections

PROFINET Connector pin configuration (RJ45)

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

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

Figure 3.7 - HUB connection

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

Figure 3.8 - 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 Modbus-RTU interfacing.*

3.3.7 Ethernet Connection (only FT-10 FILL EN)

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

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

Ethernet Connector pin configuration (RJ45)

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

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

Figure 3.9 - HUB connection

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

Figure 3.10 - Cross PC connection

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

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

3.3.8 CANopen Connection (only FT-10 FILL CO)

CANopen connection is done with four wires as indicated below in Figure 3.11. The data line ends must be equipped with 120 ohm bus terminating resistors.
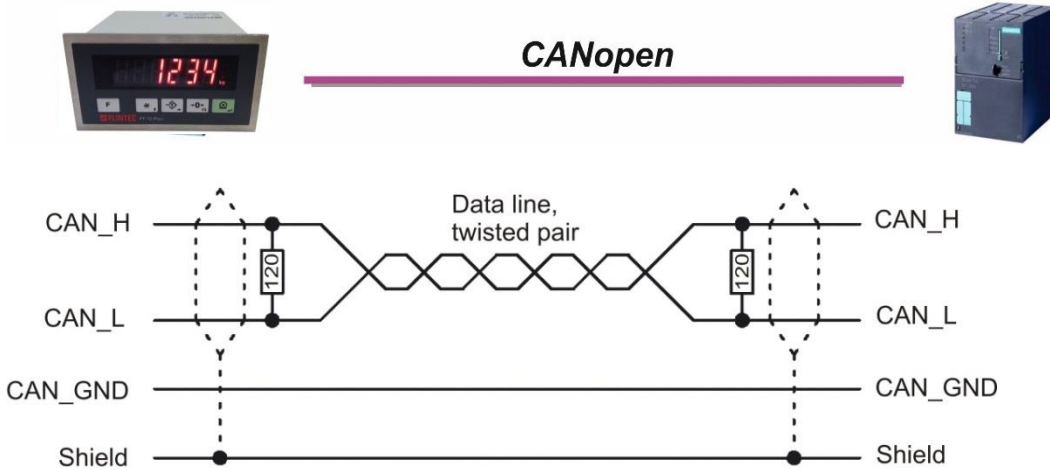
Figure 3.11 - FT-10 FILL CO serial interface connections

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	-

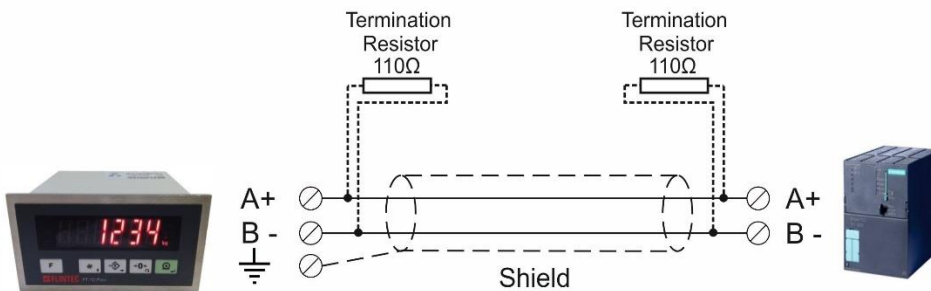Figure 3.12 - FT-10 FILL CO serial interface connector

Warning: Connect the shield to the reference ground.

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

3.3.9 EtherNet/IP Connection (only FT-10 FILL EI)

EtherNet/IP connection is done as indicated below in Figure 3.13.

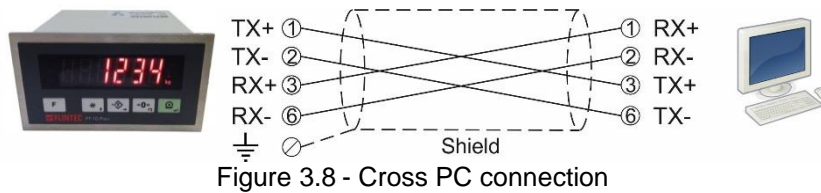**Figure 3.13 – FT-10 FILL EI interface connections**

EtherNet/IP Connector pin configuration (RJ45)

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

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

Figure 3.14 - HUB connection

The PC connection cabling will be done via cross cable as shown below. IP address blocks and gateway address of FT-10FILL and PC should be the same in cross connection.
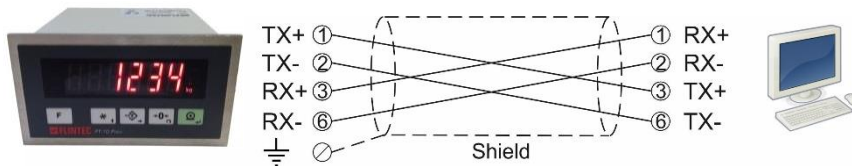
Figure 3.15 - Cross PC connection

Warning: Connect the shield to the reference ground or shield pin of the power connector.
Warning: Disconnect IndFace1X PC software before starting EtherNet/IP interfacing.
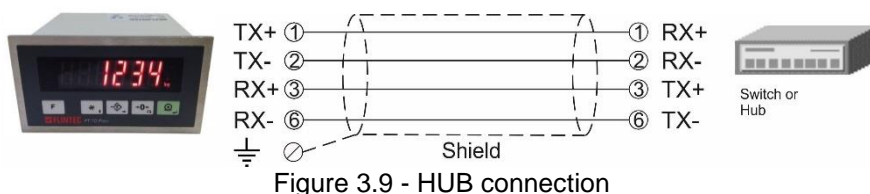
3.3.10 EtherCAT Connection (only FT-10 FILL EC)

EtherCAT connection is done as indicated below in **Figure 3.16**.

Figure 3.16 – 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 3.17 - HUB connection

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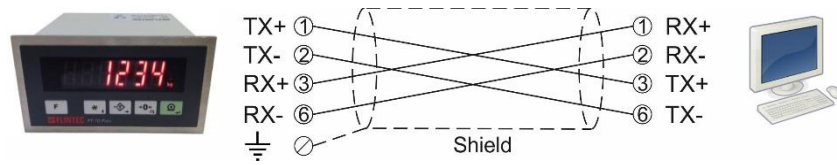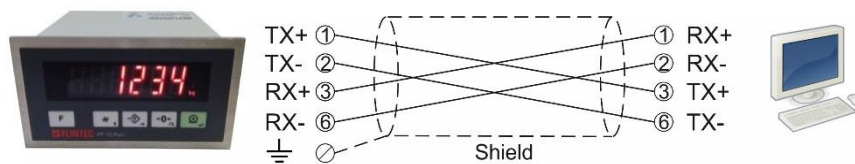

Figure 3.18 - Cross PC connection

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

3.3.11 CC-Link Connection (only FT-10 FILL CC)

CC-Link connection is done as indicated below in **Figure 3.19**.

Figure 3.19 – FT-10 FILL 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
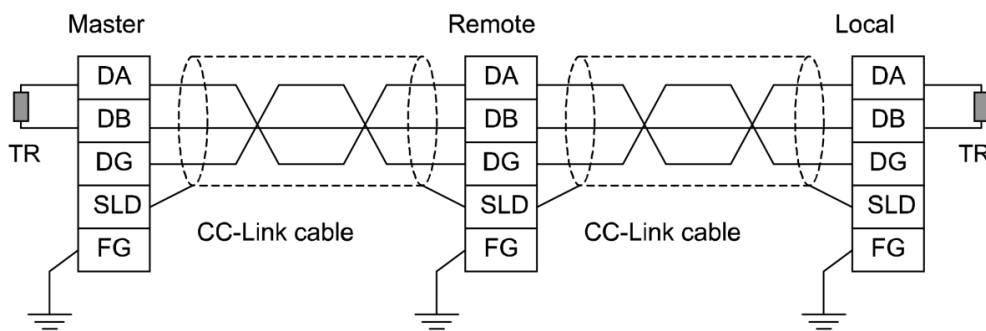
Warning: Connect the shield to the reference ground or shield pin of the power connector.
Warning: Disconnect IndFace1X PC software before starting CC-Link interfacing.

3.3.12 Powerlink Connection (only FT-10 FILL PL)

Powerlink connection is done as indicated below in Figure 3.16.

Figure 3.20 - BX13 PL interface connections

Powerlink Connector pin configuration (RJ45)

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

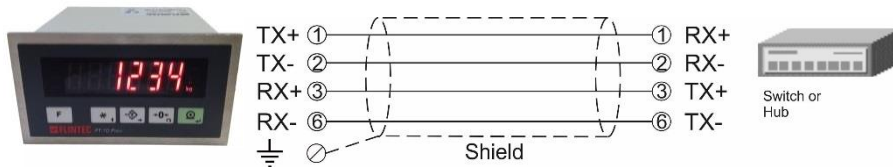The HUB connection cabling will be a direct connection as shown below:

Figure 3.21 - HUB connection

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

3.3.13   Digital Inputs and Outputs Connection

Inputs connection diagram is shown in Figure 3.22.
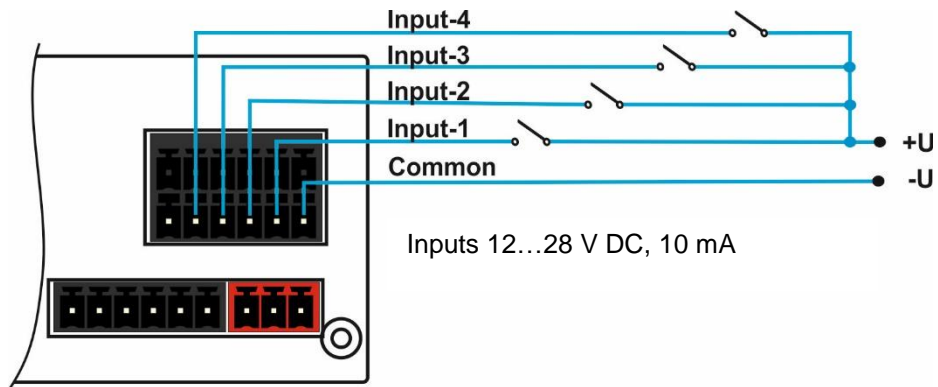
Figure 3.22 - Inputs connection diagram

Outputs connection diagram is shown in Figure 3.23.
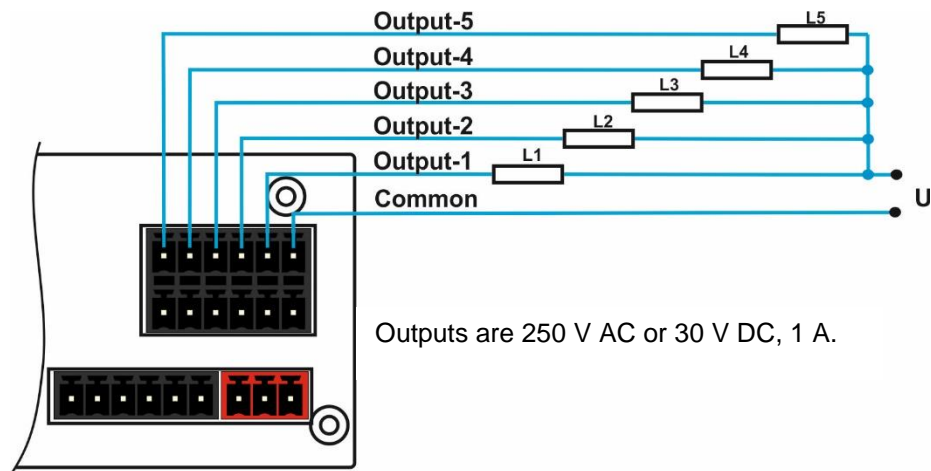
Figure 3.23 - Outputs connection diagram

Non-isolated outputs ($U_0 = 24$ V -1.5 V), 100 mA. Connection diagram is shown in Figure 3.24.
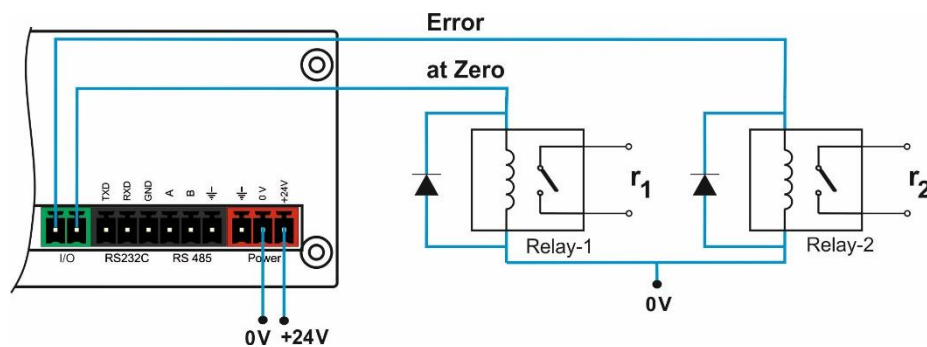
Figure 3.24 - Non-isolated outputs connection diagram

3.4 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 FILL, 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-10FILL instruments.

<u>To start up</u> the filling system, please follow as:

1. Connect parallel I/O connector prepared according to the selected filling mode 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 *Process* parameters for your filling mode as explained in filling modes.
5. Enter *Target* and *Preset* values as explained on Page 68*.*

4. PROGRAMMING AND CALIBRATION

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

F	*	⟨key⟩	→0←	⟨key⟩
Exit without saving	Advancing next parameter	Select the digit will be changed	Changing parameter value or increasing the blanking digit	Enter

4.1 Entering the Programming and Calibration

The calibration DIP switch should be "ON" (downward) to change the metrological related parameters including calibration

If any, a set-up DIP switch on FT-10 FILL's rear side and its position should be "ON" (downward) to change the metrological related. There is no need to open the housing to change the position of this DIP switch.
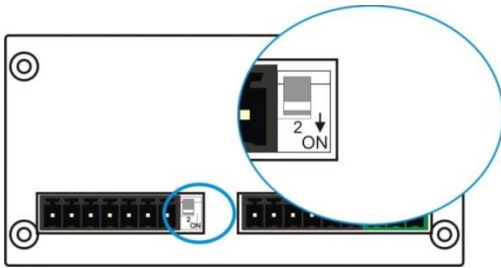
Figure 4.1 - The location of calibration DIP switch

Display	Operation
[123.456 kg]	Press [F] key until [**PASSWr**] prompts seen.
[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. As you enter the block you will reach the first sub-block in that main block. The sub-block address will be seen on the display as [**X0-**]. You can also search between the sub-blocks by using <[*]> key and reach the first parameter of the sub-block seen on the display by pressing <[Ⓞ]> key. The number of the parameter comes on display as [**XY0**]. Again you can search between parameters by <[*]> key. For entering numerical value in the parameters, press the <[key]> key to select the digit and press the <[→0←]> key the change the value.

4.2 Fast Access to the Calibration

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

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

4.3 Exiting the Programming and Calibration

If you press < [F] > key on which parameter you are, you will get out of the active sub-block and reach the next sub-block. If you press < [F] > key again, you will get out of the active block and reach the next main block. If you press < [F] > key once again, the [**SAvE**] message appears on the display. Here you can press < [Ⓞ↵] > key to save the changes into the memory, or you can press < [⟳] > key to store the changes until the power goes off, or you can press < [F] > key to abort changes. [**Waıt**] message will be seen 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.

4.4 Programming

4.4.1 Serial Port, Printer and Fieldbuses

[0--] Interface Block

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

[00-] RS 232C Serial Port

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

[000 3] Data Format

0	: No data transfer.		
1	: Continuous data output (*)		(Page 71)
2	: Print mode	(Parameter [040]	(Page 31)
3	: BSI command set		(Page 73)
4	: Modbus RTU High-Low		(Page 78)
5	: Modbus RTU Low-High		(Page 78)
6	: Fast continuous mode		(Page 72)

*(*)* **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 an address.

[004 0] Data length and parity

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

[005 0] Checksum

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

0 : No checksum   1 : Checksum enable

[006 1] Carriage return

You can enable or disable for continuous data format.

0 : No CR   1 : CR enables

[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 FILL.

[010 5] Data Format

0 : No data transfer.

1 : Continuous data output ^(*)   (Page 71)

2 : Print mode   (Parameter [**040**]   (Page 31)

3 : BSI command set   (Page 73)

4 : Modbus RTU High-Low   (Page 78)

5 : Modbus RTU Low-High   (Page 78)

6 : Fast continuous mode   (Page 72)

(*) **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 an address.

[014 0] Data length and parity

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

[015 0] Checksum

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

0 : No checksum   1 : Checksum enable

[016 1] Carriage return

You can enable or disable for continuous data format.

0 : No CR   1 : CR enables

[017 1] Line feed

You can enable or disable for continuous data format.

0 : No LF   1 : LF enables

[018 0] Response Speed

0 : Modbus RTU Answer is sent immediately after Request is received.

1 : Modbus RTU Answer is delayed 20 msec after Request is received.

   This property is very helpful for slow PLC systems

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

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

[030   5] Data Format

0   : No data transfer.

1   : Continuous data output   (Page 71)

2   : Print mode   (Parameter [040]   (Page 31)

3   : BSI command set   (Page 73)

4   : Modbus TCP High-Low (*)   (Page 90)

5   : Modbus TCP Low-High (*)   (Page 90)

6   : Fast continuous mode   (Page 72)

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

[031 001] Device Address

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

[032   ] IP Address

The IP address will be entered as "aaa.bbb.ccc.ddd". Default is "192.168.16.250".

For changing the IP address, press the <**Tare**> key and enter the first 3 "a" digits of the IP address. Press <**Enter**> 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 <**Tare**> key and enter the first 3 "a" digits of the IP address. Press <**Enter**> 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 <**Tare**> key and enter the first 3 "a" digits of the IP address. Press <**Enter**> 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 RTU Answer is sent immediately after Request is received.

1   : Modbus RTU Answer is delayed 20 ms after Request is received.

2   : Modbus RTU Answer is delayed 50 ms 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 72)
2 : Multi line-24   (Page 72)
3 : Multi line-16   (Page 72)

[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 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 minimum print value to reprint. If this parameter selected as print interlock, after printing the weight must be changed to reprint.*

[044 XY] Line Feed Before Printing
X=0,1   : 0 means the forward feeding and 1 means the backward feeding.
Y=0,1,2...9   : Enter the number of the feed lines before data printing

[045 XY] Line Feed After Printing
X=0,1   : 0 means the forward feeding and 1 means the backward feeding.
Y=0,1,2….9   : Enter the number of the feed lines after data printing

[046   0] Form Feed
0 : No Form Feed
1 : After printing, the printer will go to next page automatically.

[047   3] Space on the left
Here you can enter the number to shift the printout to the right on the paper.
Available values are from 0 to 9.

[048   1] Quantity of Copies
X = 1,2….9   :Enter the label quantity for each weighing.

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

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

This sub-block includes the parameters related with the Profibus interfaces of FT-10 FILL 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 FILL will be entered via keypad between 001 to 126.

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

This sub-block includes the parameters related with the Profinet interfaces of FT-10 FILL 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 FILL CO, CC)

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.

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

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

4.4.2 Configuration Block [1--]

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

[116   3] Function key

This ⌈F⌉ key function is programmed as;

0 : No any
1 : Total
2 : 1/hour (ton/hour or klb/hour) indication
3 : Quantity
4 : Last filling value

Explanation: If this parameter is selected as total or quantity, to clear the weight the <Clear> key must be pressed while the weight value is displayed. [Clear] will appear on the display. Confirm by pressing <Enter> key or cancel by pressing <F> key.

[117   0] Zero Range Output

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

[12-] Filter

In this block the proper filter values according to the operating conditions can be entered. One of the most important features of FT-10 series is viewing filter characteristic on the display and with the help of this option, you can select the most suitable filter without exiting the programming mode.

[120 7] Filter

The filter value can be selected from 0 to 9 (The minimum value of the filter, at least 7 in normal weighing applications). As you enter this parameter and press <**Enter**> key while [**120   X**] seen on the display, the weight variation can be seen on the display. The value of the filter can be changed by using <↑> key and the weight variation for every value can be seen on the display. After finishing the filter selection you can go to next step by pressing the <**F**> key.

[14-] Entries

In this block you can enter the initial CN.

[142   ] Label No (CN)

[XXXXXX]

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

[143 1] Display Refresh Rate

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

4.4.3 Scale Block [2--]

[20-] Set Up

The parameters about weighing operation are being entered here.

[200 0] Approved

0 : No   1 : OIML   2 : Hopper and Tank [*]

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

[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

[205 2] Tare

0 : Disable

1 : Multi tare via key

2 : Tare via key if scale is in gross mode

[206 2] Motion Detector

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

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

[21-] Scale Build

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

[212   ] Capacity

Press key to reach this parameter.

[CAP][XXXXXX]

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

[d   ] [XXXXXX]

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

[214 1]   Unit

0 : kg   (Kilogram)

1 : lb   (Libre)

2 : NO   (without unit)

4.5 Calibration Block [3--]

The calibration of the scale will be performed here after the "Scale Built [21-]" is set.

[30-] Calibration

[301   ] Calibration

Calibration involves emptying the scale then placing a known test weight on the scale and allowing the FT-10 FILL 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 platform, then press [⊙↵].

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

4. After the [**Load**] prompt, the test weight value will be used for the calibration seen on the display as [**XXXXXX**] . If the value of the test weights that will be used is different from the value shown on the display, type the new value via [→⊕→] and [→0←] 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 For 10 seconds while span calibration is being performed.

7. At the [**SAvE**] prompt press [⊙↵] key to continue or press [F] key to exit without saving the calibration.

[302   ] Linearity Correction

For any reason like e.g. mechanical construction you may see non-linearity load cellUsing that parameter you can improve the performance of the scale. An additional calibration point 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 platform, then press [⊙↵].

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

4. At the [**Load 1**] prompt, the test weight value will be used for the first step calibration seen on the display as [**XXXXXX**] . If the value of the test weights that will be used is different from the value shown on the display, type the new value via [→⊕→] and [→0←]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 seen on the display as [**XXXXXX**] . If the value of the test weights that will be used is different from the value shown on the display, type the new value via [→⊕→] and [→0←] keys. Place weight on the platform equaling at least 90% of scale capacity, preferable at scale capacity as much as is practical.

8. Place the test weights or another practical weight on the scale.

9. Press [⊙↵] to start second step span calibration. [**WAıt**] message will be shown on the display 10 seconds while the span calibration is being performed.

10. At the [**SAvE**] prompt press [⊙↵] key to continue to the next parameter or press [F] 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 any weight on the platform, then press ⊙.

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

4. At the [**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 performs span adjustment.

1. Press ⊙ at the [**311**   ] prompt to start the span adjustment.

2. At the [**XXXXXX**] prompt, the test weight value will be used for the calibration seen on the display. If the value of the test weights that will be used is different from the value shown on the display, type the new value via tare and zero keys. A minimum of 20% of scale capacity is necessary for calibration; Flintec recommends 50 to 100%. A calibration error will result if insufficient weight is used.

3. Place the test weights or another practical weight on the scale.

4. Press ⊙ to start span calibration. [**WAıt**] message will be shown on the display 10 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 on it. This operation especially used for span adjustment for filled tanks. You can make span adjustment without emptying the tank.

1. Press ⊙ at the [**312**   ] prompt to start the span adjustment under load.

2. [**P.ZEro**] prompt appears on the display to indicate the scale load will be determined as temporary zero.

3. Press ⊙ key and the display will show [**WAıt**] message during temporary zero adjustment.

4. Shortly after a message [**LoAd**] and then [**XXXXXX**] will appear on the display as suggested test weight for calibration. If the value of the test weights that will be used is different from the value shown on the display, type the new value via ⊡ and +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.

Warning: *The scale capacity and resolution (parameter [212]) shall be entered before performing eCal.*

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

[LC.CAP] [XXXXXX]

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

[LC.oUt] [XXXXXX]

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

[ZEr.AdJ] [XXXXXX]

If the scale is empty and you want to make automatic zero adjustment instead of entering estimated dead load (see next step), press ⬚ key. After [**Zero.CA**] appears, press ⬚ key for starting zero adjustment. The display will show [**WAıt**] message during zero adjustment. In this while the scale must be unloaded and stable. Approximately 10 seconds later the display will prompt you to save the calibration by [**SAvE**] message below.

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

[PrE-Ld] [XXXXXX]

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

[SAvE]

Save your eCal calibration by pressing ⬚ key or press ⬚ key to go out without saving your 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.*

4.6 Metrological Data Block [8--]

The parameters about Metrologic Registry are being entered in this section.

[80-] Legal Metrologic Records

[800]   Counter

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

4.7 Diagnostics [9--]

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

[90-] Tests

[900   ] Key Pad testing

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

[901   ] RS 232C Serial Interface testing

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

[902   ] RS 485 Serial Interface testing

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

[903   ] Parallel Inputs

[ı   X   Y]

To perform parallel input test, enter the number of parallel input to Y digits via <**Zero**> 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 <**Zero**> key. To change the logical condition of that output via <**Tare**> key and X shows the logical condition of that output.

[905   ] mV Indication

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

[91-] Firmware Information

[910   ] Version of Option Board
[XX.YY]

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

[92-] Log Book

[920   ] Error history
[Err XX]

The last 20 errors listed in this parameter. Press < * > key to access the previous error log.

[921   ] Setup history
[SErVɪCE]

The last 20 service entry listed in this parameter. Press < * > key to access the previous entry log.

[99-] Printing Parameter Values

[990]   Print All Parameters

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

[991]   Load Default

Press <**Enter**> key. [**Ld dEf**] message appears on the display. Press <**Tare**> key for loading default parameter values or press <**F**> key to go [**9-**] sub block.

The scale build parameters and calibration is not changed.

5. FILLING MODES

Mode	Description	Application
1	Open container filling as Gross	Liquid or bulk filling into container
2	Open container filling as Net	Bag, Big bag filling Automatic rotary filling machines
3	Bung-Type container filling as Gross	Above level liquid filling
4	Bung-Type container filling as Net	
5	Accurate filling and emptying	Automatic bagging machines Big bag filling from hopper scale
6	Multicycle packing/bagging	Filling mode for bigger bags than the hopper capacity.
7	Weight-in / Weight-out	Sticky/high viscosity materials filling from hopper / tank scale.
8	Filling into the bag	For bagging machines which filling the bag by weighing the bag.

The meaning of parallel I/Os are given in section 3.3.13. on Page 24.

To start up filling system, please follow as:

1. Make parallel I/O connections according to the selected filling mode.
2. Please enter Programming in menu **[5--]** and Scale Build parameters in menu **[2--]** and Calibration parameters in parameter menu **[3--].**
3. Enter process parameters for your filling mode as explained in application modes.
4. Enter Target and Preset values as explained in section 6 on Page 68.
5. Test your filling machine, if needed adjust the filling related parameters and digital filter for better performance.

Meaning of the parameters on the filling cycle diagram, Figure 5.1.

In this diagram, the instrument do not follow the weight during coarse and fine feeding control delay periods to increase the reliability of the system; and read the actual weight value at the end of settling time for cut-off point adjustment.
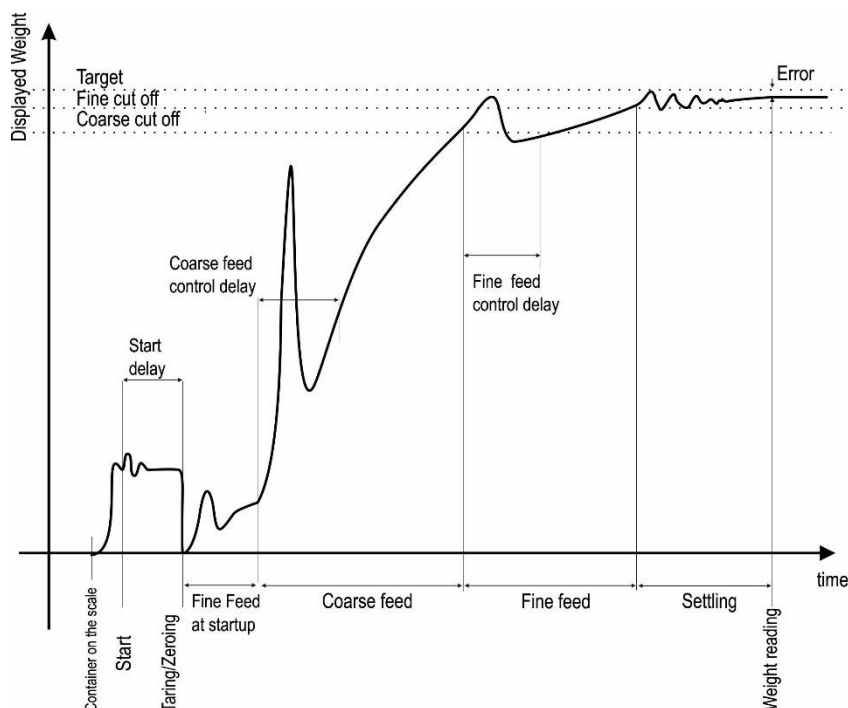
Figure 5.1 - Typical filling diagram (displayed weight vs. time)

5.1 Mode 1: Open Container Filling as Gross
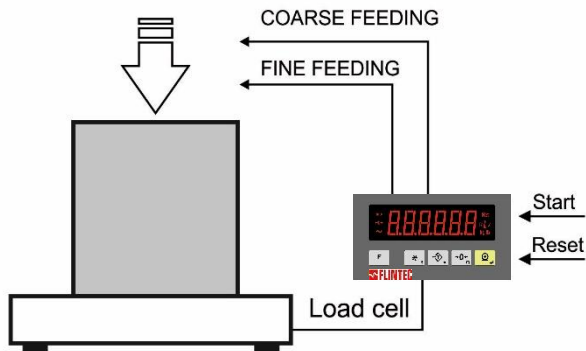
Typical Applications
- Open container filling.
- Filling into big bag.

Operation
- Filling starts with Start Input or automatically and is executed as 2 speeds directly into a container.
- Process ends after removing the container from the platform.

Mode Related Filling Parameters
The mode related filling parameters shall be entered before start up the filling. Please enter the values below carefully for better filling performance of the filling machine.

Display	Operation
[**123.456** kg]	Press long [*] key, [**tArE_ _**] message appears.
[**tArE _ _]** ↻ [XXXXX]	**Minimum tare value.** Filling can start if the weight of the container is bigger than this value. Enter minimum tare value by pressing [ ] and [→0←] keys. Press the [⊙] key to go to the next parameter.
[**tArE ¯ ¯]** ↻ [XXXXX]	**Maximum tare value.** Filling can start if the weight of the container is lower than this value. Enter maximum tare value by pressing [ ] and [→0←] keys. Press the [⊙] key to go to the next parameter.
[**d_FiLL]** ↻ [XXXXX]	**Filling Start delay.** This parameter delays the feeding after applying start input or automatic start. Enter start delay value by pressing [ ] and [→0←] keys. Press the [⊙] key to go to the next parameter. Maximum value is 9.9 seconds. Default is 0.0 seconds.
[**d_Strt]** ↻ [XXXXX]	**Auto start control delay.** This parameter delays after weight bigger than Minimum tare value and filling starts automatically at the end of this delay. Enter the value by pressing [ ] and [→0←] keys. Press the [⊙] key to go to the next parameter. Maximum value is 9.9 seconds. Default is 0.0 seconds.
[**S_tYPE]** ↻ [XXXXX]	Start type. 0 = Manual. Filling starts by input or fieldbus. 1 = Automatic. Filling starts when weight bigger than Minimum tare value. Enter Start type by pressing [ ] and [→0←] keys. Press the [⊙] key to go back to the operation. Default is 0.

Note: For **TARGET** and **TOLERANCE** entry please see section 6, page 68

Mode 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
[**StArt**]	This message is shown on the display during Start Delay.
[**FuLL**] ↻ [XXXXX]	This message is shown at the end of filling. [**FuLL**] message and the weight value are shown alternately until the container is removed from the platform.
[**E trnG**] ↻ [XXXXX]	Tare range error message appears if tare of the container is not between minimum tare and maximum tare values entered in process parameters above. This error is acknowledged by Start Input, if the tare goes in to the range.
[**No FEEd**]	Feeding error message appears if weight value is not increased after feeding output is activated. Refer to parameter **[508]**
[**FıLL t**]	This prompt announces that the filling is not finished in the filling time and is ended. Error is cancelled by Reset input. Refer to parameter [**509**].

Filling cycle

Press <**Zero**> key if the scale is not indicated zero after powered on. Apply start input after loading the scale with the container. The filling is done as indicated below. The [**FuLL**] prompt is displayed after end of the filling and take off the container. After loading the next container press the start input again to fill it.

Notes

*1) There is a preact adjustment delay only in preact adjustment frequency (refer to parameter [**503**]).*

*2) The fine feed output is activated 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 of filling
Input 2	-
Input 3	-
Input 4	Reset
Output 1	Coarse feeding
Output 2	Fine feeding
Output 3	-
Output 4	End of filling
Output 5	-
E	Error
Z	at Zero range (refer to par. **[117]**)

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.

5.2 Mode 2: Open Container Filling as Net
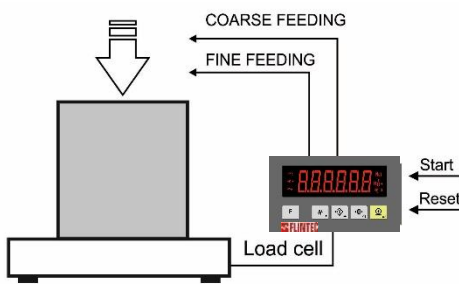
Typical Application
- Open container filling.
- Filling in to big bag.

Operation
- Filling starts with Start Input or automatically and is executed as 2 speeds directly into a container.
- Process ends after removing the container from the platform.

Mode Related Filling Parameters
The mode related filling parameters shall be entered before start up the filling. Please enter the values below carefully for better filling performance of the filling machine.

Display	Operation
[**123.456** kg]	Press long [*] key, [**tArE_ _**] message appears.
[**tArE** _ _] ↻ [XXXXX]	**Minimum tare value.** Filling can start if the weight of the container is bigger than this value. Enter minimum tare value by pressing [↕] and [→0←] keys. Press the [◎] key to go to the next parameter.
[**tArE** ¯ ¯] ↻ [XXXXX]	**Maximum tare value.** Filling can start if the weight of the container is lower than this value. Enter maximum tare value by pressing [↕] and [→0←] keys. Press the [◎] key to go to the next parameter.
[**d_FɪLL**] ↻ [XXXXX]	**Filling Start delay.** This parameter delays the feeding after applying start input or automatic start. Enter start delay value by pressing [↕] and [→0←] keys. Press the [◎] key to the next parameter. Maximum value is 9.9 seconds. Default is 0.0 seconds.
[**d_Strt**] ↻ [XXXXX]	**Auto start control delay.** This parameter delays after weight bigger than minimum tare value and filling starts automatically at the end of this delay. Enter the value by pressing [↕] and [→0←] keys. Press the [◎] key to go to the next parameter. Maximum value is 9.9 seconds. Default is 0.0 seconds.
[**S_tYPE**]↻ [XXXXX]	Start type. 0 = Manual. Filling starts by input or fieldbus. 1 = Automatic. Filling starts when weight is bigger than Minimum tare value. Enter Start type by pressing [↕] and [→0←] keys. Press the [◎] key to go back to the operation. Default is 0.

Note: For **TARGET** and **TOLERANCE** entry please see section 6, page 68

Mode 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
[**StArt**]	This message is shown on the display during Start Delay.
[**FuLL**] ↻ [XXXXX]	This message is shown at the end of filling. [**FuLL**] message and the weight value are shown alternately until the container is removed from the platform.
[**E trnG**] ↻ [XXXXX]	Tare range error message appears if tare of the container is not between minimum tare and maximum tare values entered in process parameters above. This error is acknowledged by Start Input, if the tare goes in to the range.
[**E tArE**] ↻ [XXXXX]	This message appears if Taring is not possible. For example, if the weight is negative or scale is not stable. It is shown alternately by the weight value. When the conditions become normal, error is acknowledged by Start Input.
[**No FEEd**]	Feeding error message appears if weight value is not increased after feeding output is activated. Refer to parameter **[508]**
[**FɪLL t**]	This prompt announces that the filling is not finished in the filling time and is ended. Error is cancelled by Reset input. Refer to parameter [**509**].

Filling cycle

Press <**Zero**> key if the scale is not indicated zero after powered on. Apply start input after loading the scale with the container. The filling is done as indicated below. The [**FuLL**] prompt is displayed after end of the filling and take off the container. After loading the next container press the start input again to fill it.

Notes

*1) There is a preact adjustment delay only in preact adjustment frequency (refer to parameter [**503**]).*

*2) 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 of filling
Input 2	-
Input 3	-
Input 4	Reset
Output 1	Coarse feeding
Output 2	Fine feeding
Output 3	-
Output 4	End of filling
Output 5	-
E	Error
Z	at Zero range (refer to par. [**117**])

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.

5.3 Mode 3: Bung-Type Container Filling as Gross
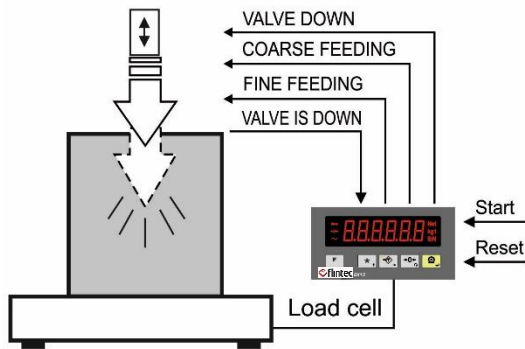
Typical Application

- Container which has bunghole filling in gross.
- Tin, drum filling machines.

Operation

- After receiving start input or automatically, filling valve goes through hole of the container.
- Filling starts and is executed as 2 speeds directly into a container as above surface.
- At the end of feeding, the valve runs out of the container. Process ends when the filled container removed from the platform.

Mode Related Filling Parameters
The mode related filling parameters shall be entered before start up the filling. Please enter the values below carefully for better filling performance of the filling machine.

Display	Operation
[**123.456** kg]	Press long [*] key, [**tArE_ _**] message appears.
[**tArE _ _**] ↻ [XXXXX]	**Minimum tare value.** Filling can start if the weight of the container is bigger than this value. Enter minimum tare value by pressing [⟳] and [→0←] keys. Press the [⊙] key to go to the next parameter.
[**tArE ⁻ ⁻**] ↻ [XXXXX]	**Maximum tare value.** Filling can start if the weight of the container is lower than this value. Enter maximum tare value by pressing [⟳] and [→0←] keys. Press the [⊙] key to go to the next parameter.
[**SAFEtY**] ↻ [XXXXX]	**Safety.** If filling valve doesn't go through hole of the container, this parameter saves the system. While the filling valve is moving down, if the weight is bigger than safety weight, valve moves up and filling does not start. Condition : Safety > Maximum tare value. Enter safety weight by pressing [⟳] and [→0←] keys. Press the [⊙] key to go to the next parameter.
[**d_FɪLL**] ↻ [XXXXX]	**Filling Start delay.** This parameter delays the feeding after applying start input or automatic start. Enter start delay value by pressing [⟳] and [→0←] keys. Press the [⊙] key to go to the next parameter. Maximum value is 9.9 seconds. Default is 0.0 seconds.
[**d_Strt**] ↻ [XXXXX]	**Auto start control delay.** This parameter delays after weight bigger than minimum tare value and filling starts automatically at the end of this delay. Enter the value by pressing [⟳] and [→0←] keys. Press the [⊙] key to go to the next parameter. Maximum value is 9.9 seconds. Default is 0.0 seconds.
[**S_tYPE**] ↻ [XXXXX]	Start type. 0 = Manual. Filling starts by input or fieldbus. 1 = Automatic. Filling starts when weight is bigger than Minimum tare value. Enter Start type by pressing [⟳] and [→0←] keys. Press the [⊙] key to go back to the operation. Default is 0.

Mode 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
[**StArt**]	This message is shown on the display during Start Delay.
[⁻ - _ - ⁻]	Means the filling valve is going down. It disappears after the valve goes completely down.
[_ - ⁻ - _]	Means the filling valve is going up. It disappears after the filling valve goes up position.
[**FuLL**] ⟳ [XXXXX]	This message is shown at the end of filling. [**FuLL**] message and the weight value are shown alternately until the container is removed from the platform.
[**E trnG**] ⟳ [XXXXX]	Tare range error message appears if tare of the container is not between minimum tare and maximum tare values entered in process parameters above. This error is acknowledged by Start Input, if the tare goes in to the range.
[**E HoLE**]	While the filling valve is going down, if the weight is bigger than safety weight this message appears. Reset is waited for.
[**E vALv**]	This prompt is displayed and feeding stops, if "Filling Valve is Down" input becomes passive during feeding. Feeding starts again after "Filling Valve is Down" input becomes "active".
[**No FEEd**]	Feeding error message appears if weight value is not increased after feeding output is activated. Refer to parameter **[508]**.
[**FıLL t**]	This prompt announces that the filling is not finished in the filling time and is ended. Error is cancelled by Reset input. Refer to parameter [**509**].

Filling cycle

Press <**Zero**> key if the scale is not indicated zero after powered on. Apply start input after loading the scale with the container. The filling is done as indicated below. The [**FuLL**] prompt is displayed after end of the filling and take off the container. After loading the next container press the start input again to fill it.

Notes

*1) There is a preact adjustment delay only in preact adjustment frequency (refer to parameter [**503**]).*

*2) 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 of filling
Input 2	Valve is down
Input 3	-
Input 4	Reset
Output 1	Coarse feeding
Output 2	Fine feeding
Output 3	Valve down
Output 4	End of filling
Output 5	-
E	Error
Z	at Zero range (refer to par. [**117**])

Example of a connection diagram

Emergency Stop

Auto / Manual
2 — Manual (1)
o 0
1 Auto

SW1 Valve is Down

b3 Reset

U1

b1 Start for Filling

Input Common

In1 In2 In3 In4

Power Supply +24 V
0 V

+24 V

0 V

FT-10 Fill; FILLING CONTROLLER

Error Output

Output Common

Out1 Out2 Out3 Out4 Out5

(2) R1

U2

(2) R2 (2) R3 (2) R4 (2) R5

Coarse Feeding

Fine Feeding

Valve Down

End of Filling

U3

r1 r2 r3 r4 r5

Error Output

Coarse Feeding

Fine Feeding

Valve Down

End of Filling

(1) Manual control circuitry is not indicated.

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

5.4 Mode 4: Bung-Type Container Filling as Net
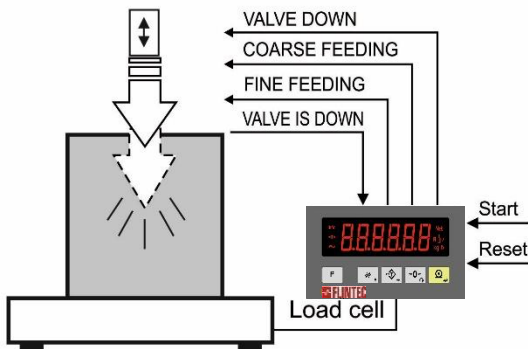
Typical Applications

- Container which has bunghole filling in net.
- Tin, drum filling machines.

Operation

- After receiving start input or automatically, filling valve goes through hole of the container.
- Filling starts is executed as 2 speeds directly into a container as above surface.
- At the end of feeding, the valve runs out of the container. Process ends when the filled container removed from the platform.

Mode Related Filling Parameters
The mode related filling parameters shall be entered before start up the filling. Please enter the values below carefully for better filling performance of the filling machine.

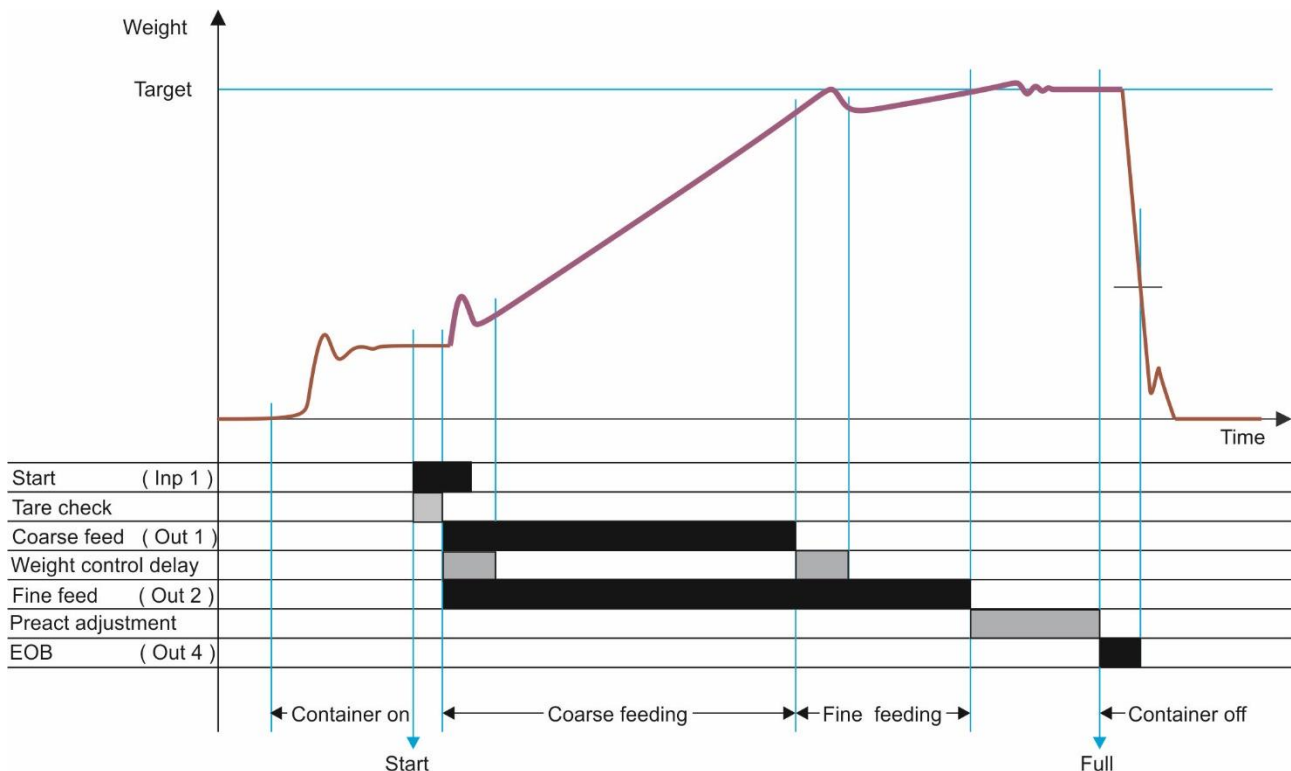| Display	Operation
[**123.456** kg]	Press long [*] key, [**tArE_ _**] message appears.
[**tArE _ _**] ↻ [XXXXX]	**Minimum tare value.** Filling can start if the weight of the container is bigger than this value. Enter minimum tare value by pressing [ ] and [+0←] keys. Press the [Ω] key to go to the next par.
[**tArE ¯ ¯**] ↻ [XXXXX]	**Maximum tare value.** Filling can start if the weight of the container is lower than this value. Enter maximum tare value by pressing [ ] and [+0←] keys. Press the [Ω] key to go to the next parameter.
[**SAFEtY**] ↻ [XXXXX]	**Safety weight.** If filling valve doesn't go through hole of the container, this parameter saves the system. While the filling valve is moving down, and the weight is bigger than safety weight, valve moves up and filling does not start. Condition: Safety > Maximum tare value. Enter safety weight by pressing [ ] and [+0←] keys. Press the [Ω] key to go to the next parameter.
[**d_FıLL**] ↻ [XXXXX]	**Filling Start delay.** This parameter delays the feeding after applying start input or automatic start. Enter start delay value by pressing [ ] and [+0←] keys. Press the [Ω] key to go to the next parameter. Maximum value is 9.9 seconds. Default is 0.0 seconds.
[**d_Strt**] ↻ [XXXXX]	**Auto start control delay.** This parameter delays after weight bigger than minimum tare value and filling starts automatically at the end of this delay. Enter the value by pressing [ ] and [+0←] keys. Press the [Ω] key to go to the next parameter. Maximum value is 9.9 seconds. Default is 0.0 seconds.
[**S_tYPE** ↻ [XXXXX]	Start type. 0 = Manual. Filling starts by input or fieldbus. 1 = Automatic. Filling starts when weight is bigger than Minimum tare value. Enter Start type by pressing [ ] and [+0←] keys. Press the [Ω] key to go back to the operation. Default is 0.

Mode 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
[**StArt**]	This message is shown on the display during Start Delay.
[⁻ - _ - ⁻]	Means the filling valve is going down. It disappears after the valve goes completely down.
[_ - ⁻ - _]	Means the filling valve is going up. It disappears after the filling valve goes up position.
[**FuLL**] ↻ [XXXXX]	This message is shown at the end of filling. [**FuLL**] message and the weight value are shown alternately until the container is removed from the platform.
[E trnG] ↻ [XXXXX]	Tare range error message appears if tare of the container is not between minimum tare and maximum tare values entered in process parameters above. This error is acknowledged by Start Input, if the tare goes in to the range.
[E tArE] ↻ [XXXXX]	This message appears if Taring is not possible. For example, if the weight is negative or scale is not stable. It is shown alternately by the weight value. When the conditions become normal, error is acknowledged by Start Input.
[E HoLE]	While the filling valve is going down, and the weight is bigger than safety weight this message appears. Reset is waited for.
[E vALv]	This prompt is displayed and feeding stops, if "Filling Valve is Down" input becomes passive during feeding. Feeding starts again after "Filling Valve is Down" input becomes "active".
[**No FEEd**]	Feeding error message appears if weight value is not increased after feeding output is activated. Refer to parameter [**508**].
[**FıLL t**]	This prompt announces that the filling is not finished in the filling time and is ended. Error is cancelled by Reset input. Refer to parameter [**509**].

Filling cycle

Press <**Zero**> key if the scale is not indicated zero after powered on. Apply start input after loading the scale with the container. The filling is done as indicated below. The [**FuLL**] prompt is displayed after end of the filling and take off the container. After loading the next container press the start input again to fill it.

Notes

1) There is a preact adjustment delay only in preact adjustment frequency (refer to parameter [503]).

2) 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 of filling
Input 2	Valve is down
Input 3	-
Input 4	Reset
Output 1	Coarse feeding
Output 2	Fine feeding
Output 3	Valve down
Output 4	End of filling
Output 5	-
E	Error
Z	at Zero range (refer to par. [117])

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.

5.5 Mode 5: Packing / Bagging
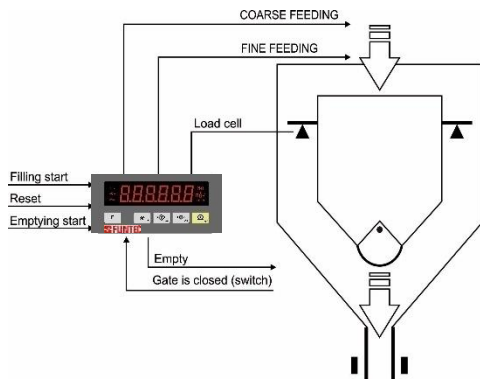
Typical Applications
- Packing and Bag filling machines.
- Weighing of additives in tank or hopper.

Operation
- The container is filled up to target value accurately as 2 speeds.
- It is emptied totally by applying emptying input.
- Process ends when the weight goes into [**Zero_r**] after emptying.

Mode Related Filling Parameters
The mode related filling parameters shall be entered before start up the filling. Please enter the values below carefully for better filling performance of the filling machine.

| Display	Operation
[**123.456** kg]	Press long ✳ key, [**Zero_r**] message appears.
[**Zero_r**] ↻ [XXXXX]	**Zero range.** This parameter has two functions; 1. At filling start: To start feeding, the weight indication has to be in Zero Range. 2. At Emptying: If the weigh is decreased in this range, the scale is accepted empty and the gate is closed. Enter zero range value by pressing ⬦ and →0← keys. Press the ⊙ key to go to the next parameter.
[**d_dıSC**]↻ [X.X]	**End of emptying delay.** After the weight value goes into zero range at emptying, [**d_dıSC**] parameter delays closing the gate for completely emptying. Enter the value by pressing ⬦ and →0← keys. Press the ⊙ 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 ⬦ and →0← keys. Press the ⊙ 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 ⬦ and →0← keys. Press the ⊙ key to go back to the operation. Default is "0".

Note: For **TARGET** and **TOLERANCE** entry please see section 6, page 68
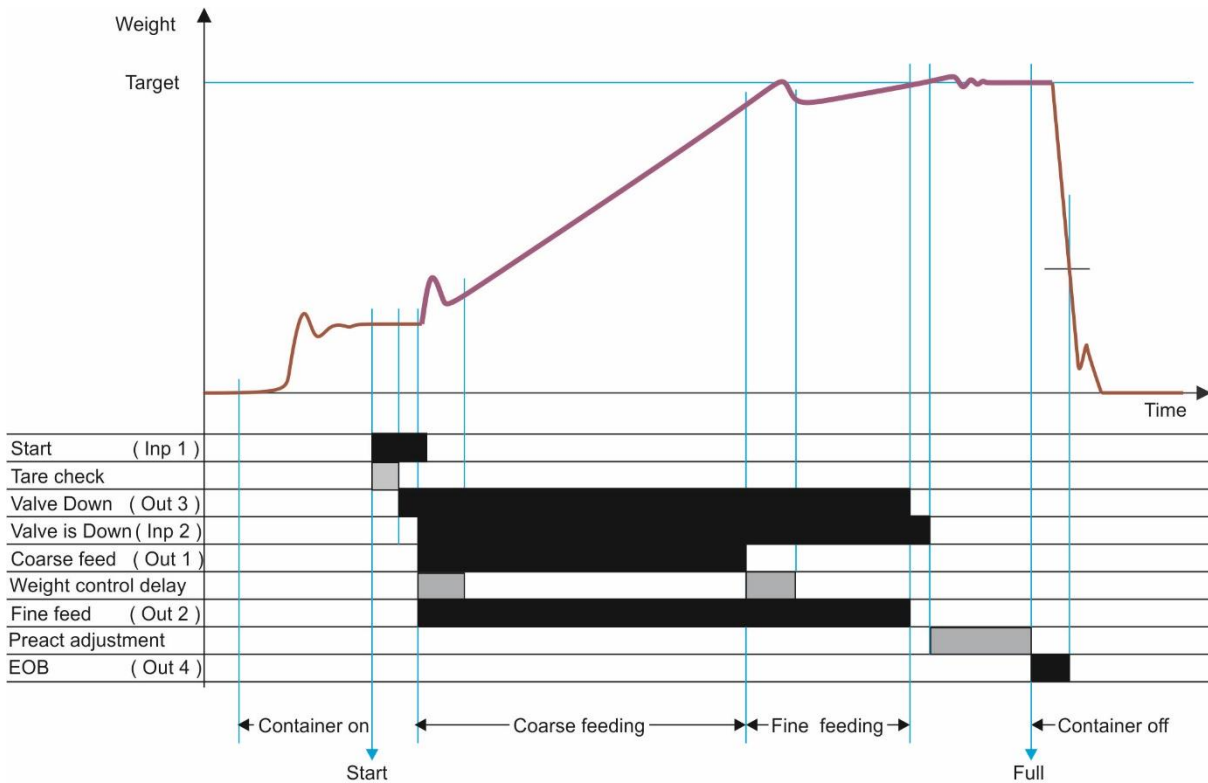
Mode Related Display Messages

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.
[**GAtE**]	It is displayed during gate position control.
[**FuLL**] ↻ [XXXXX]	This prompt is displayed at the end of Filling by toggling with the weight value. It disappears when emptying starts.
[**d_dEL**]	Emptying delay time in function.
[**E ZrnG**]↻ [XXXXX]	This error means the weight is out of [**Zero_r**] at the beginning of Filling cycle. Can be acknowledged by Start input.
[**E ZEro**]↻ [XXXXX]	This message appears if zeroing cannot be done at the beginning of filling because of the zeroing range (par. [**203**]) or unstable load. It is shown alternately by the weight value. Applying start input restarts the filling cycle. If this error seen again, the second start input starts the feeding without zeroing.
[**E GAtE**]	Gate position error.
[**No FEEd**]	Feeding error message appears if weight value is not increased after feeding output is activated. Refer to parameter [**508**].
[**FıLL t**]	This prompt announces that the filling is not finished in the filling time and is ended. Error is cancelled by Reset input. Refer to parameter [**509**].

Filling cycle

Press <**Zero**> key if the scale is not indicated zero after powered on. Apply start input to start feeding the hopper. The two speed filling cycle is shown below. The [**FuLL**] prompt is displayed after end of the filling. Emptying is start by "Start for Emptying" input. After emptying, press the start input again to go on filling.
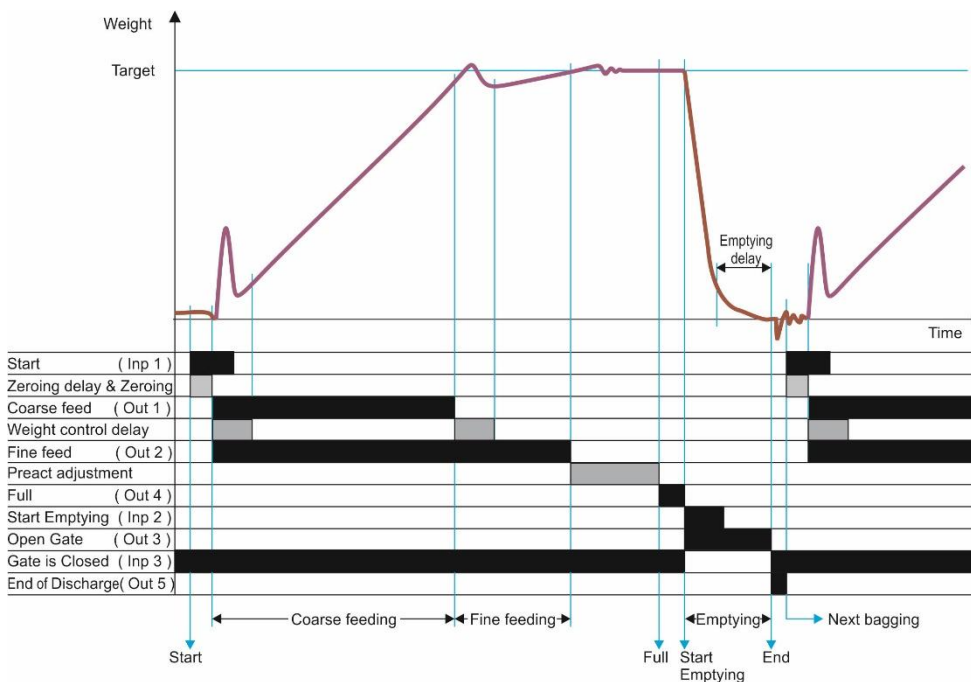
Notes

1) There is a preact adjustment delay only in preact adjustment frequency (refer to par. [503]).

2) 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
Output 1	Coarse feeding
Output 2	Fine feeding
Output 3	Empty
Output 4	Full (end of filling)
Output 5	End of emptying
E	Error
Z	at Zero range (refer to par. [**117**])
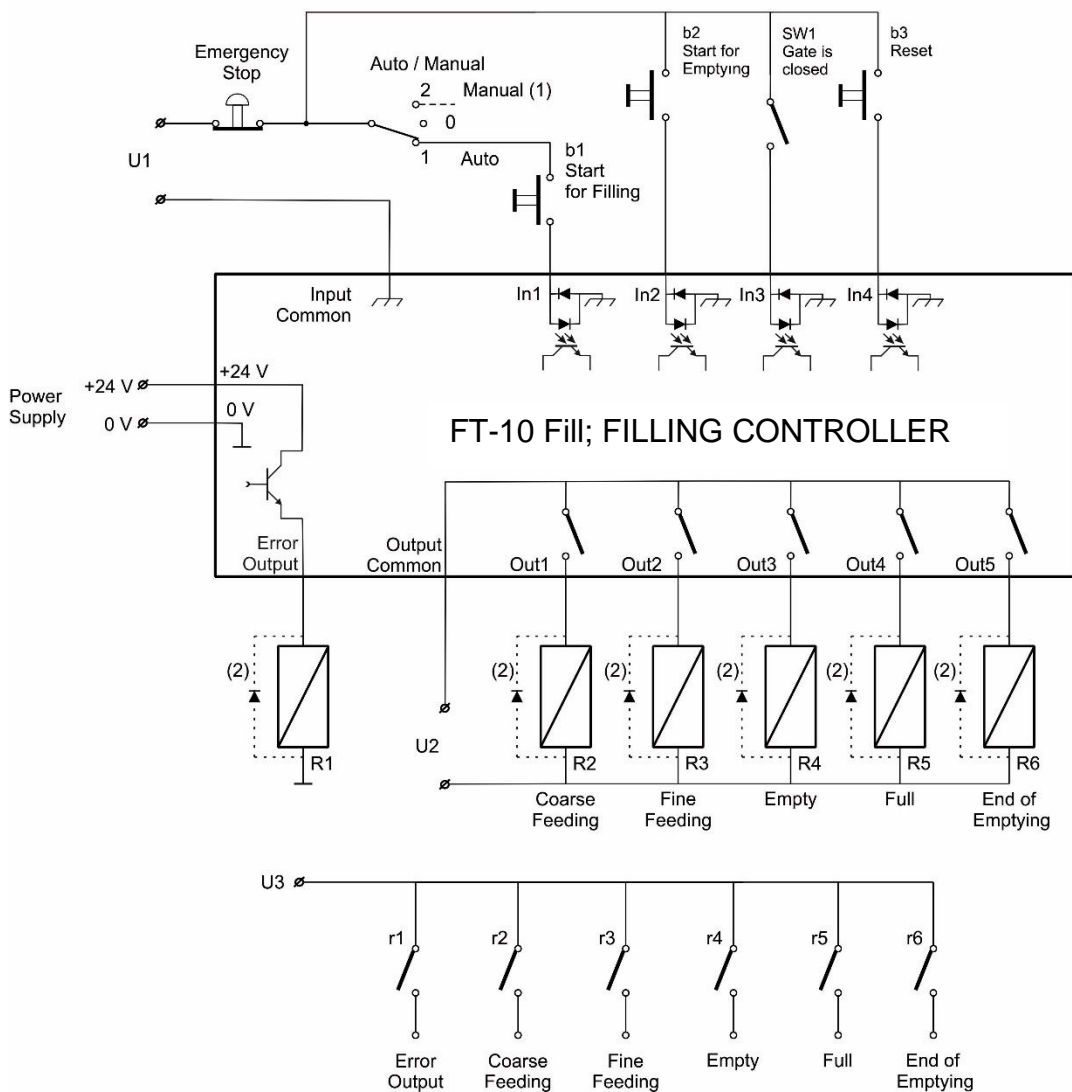
Example of a Connection Diagram

[1] Manual control circuitry is not indicated.

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

5.6 Mode 6: Multicycle Packing / Bagging
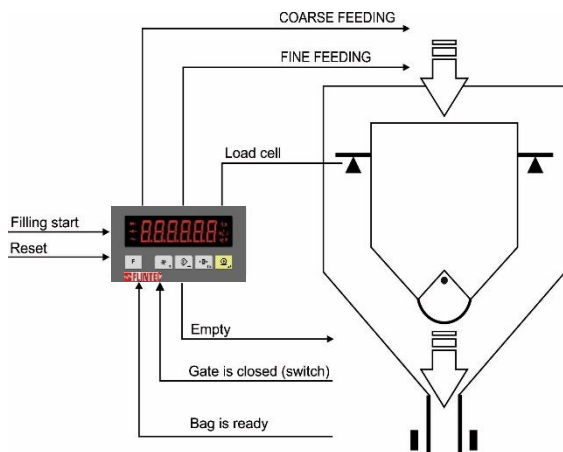
Typical Applications

- Pack / Bag filling machines for filling bags bigger than the hopper capacity.

Operation

- The hopper is filled up to target value accurately as 2 speeds.
- It is emptied totally by "bag is ready" input.
- The following Weighing and emptying processes goes on until reaching the target value.
- After filling the target weight in to the bag, the End prompt is indicated.

Mode Related Filling Parameters
The mode related filling parameters shall be entered before start up the filling. Please enter the values below carefully for better filling performance of the filling machine.

| Display	Operation
[**123.456** kg]	Press long ✱ key, [**L_trGt**] message appears.
[**L_trGt**] ↻ [XXXXX]	**Limit target.** Maximum capacity of hopper. Enter the hoper weighing capacity value by pressing ⊹ and →0← keys. Press the ⊚ key to go to the next parameter.
[**Zero_r**] ↻ [XXXXX]	**Zero range.** This parameter has two functions; 1. At filling start: To start feeding, the weight indication has to be in Zero Range. 2. At Emptying: If the weigh is decreased in this range, the scale is accepted empty and the gate is closed. Enter zero range value by pressing ⊹ and →0← keys. Press the ⊚ key to go to the next parameter.
[**d_dıSC**] ↻ [X.X]	**End of emptying delay.** After the weight value goes into zero range at emptying, [**d_dıSC**] parameter delays closing the gate for completely emptying. Enter the value by pressing ⊹ and →0← keys. Press the ⊚ 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 ⊹ and →0← keys. Press the ⊚ 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 ⎘ and ⎘ keys. Press the ⎘ key to go back to the operation. Default is "0".

Note: For **TARGET** and **TOLERANCE** entry please see section 6, page 68

Mode 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.
[**GAtE**]	It is displayed during gate position control.
[**FuLL**] ↻ [XXXXX]	This prompt is displayed at the end of Filling by toggling with the weight value. It disappears when emptying starts.
[**d_dEL**]	Emptying delay time in function.
[**End**]	Bag is full.
[**E ZrnG**] ↻ [XXXXX]	This error means the weight is out of [**Zero_r**] at the beginning of Filling cycle. Can be acknowledged by Start input.
[**E ZEro**] ↻ [XXXXX]	This message appears if zeroing cannot be done at the beginning of filling because of the zeroing range (par. [**203**]) or unstable load. It is shown alternately by the weight value. Applying start input restarts the filling cycle. If this error seen again, the second start input starts the feeding without zeroing.
[**E GAtE**]	Gate position error.
[**No FEEd**]	Feeding error message appears if weight value is not increased after feeding output is activated. Refer to parameter [**508**
[**FıLL t**]	This prompt announces that the filling is not finished in the filling time and is ended. Error is cancelled by Reset input. Refer to parameter [**509**].

Filling cycle

Press <**Zero**> key if the scale is not indicated zero after powered on. Apply start input to start feeding the hopper. The two speed filling cycle is shown below. The [**FuLL**] prompt is displayed after end of the filling. Emptying is start by "Bag is ready" input. After emptying, the following filling is started to go on the filling the bag. After filling the target value in to the bag, the end prompt is displayed.

The target weight of each weighing cycle is calculated automatically to minimize the bag filling error.

Warning: *Error correction frequency parameter [503] should be adjusted to 1 in this mode.*
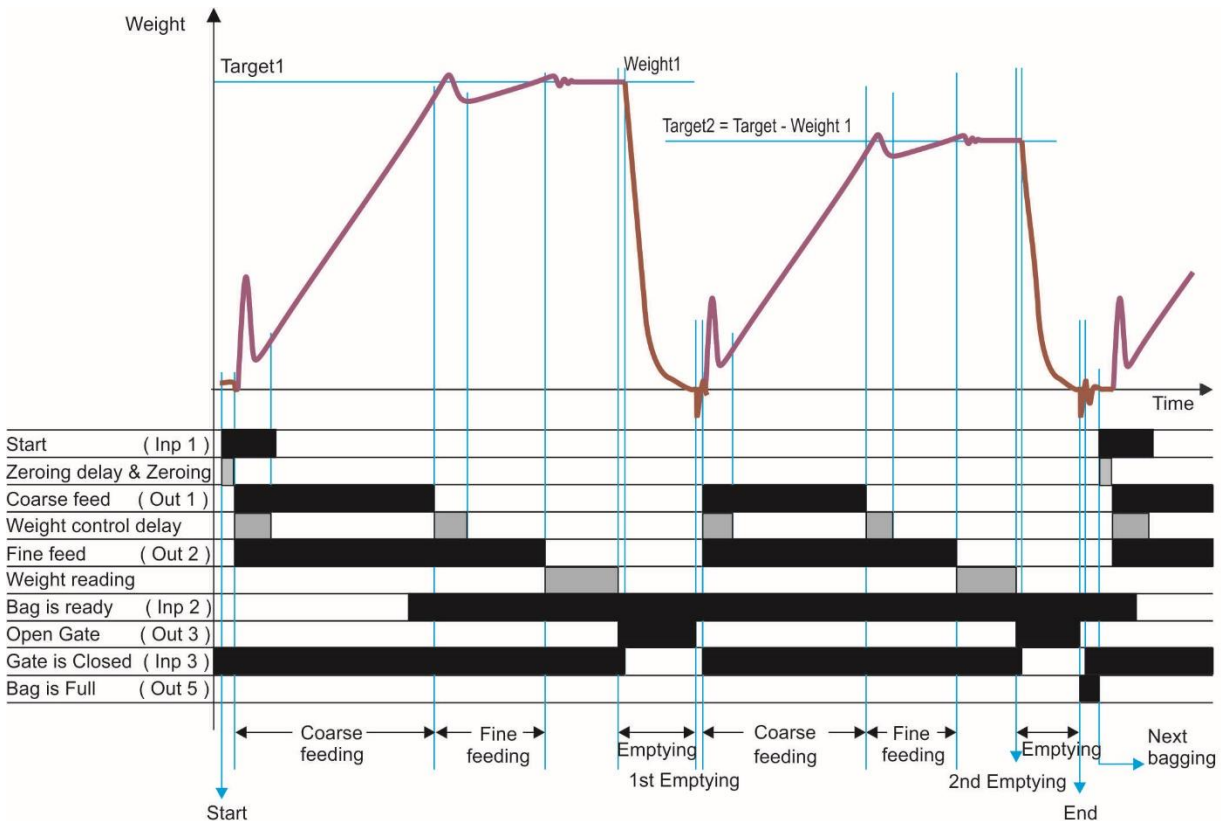
Notes

1) There is a preact adjustment delay only in preact adjustment frequency (refer to parameter [503]).

2) 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	Bag is ready
Input 3	Gate is closed
Input 4	Reset
Output 1	Coarse feeding
Output 2	Fine feeding
Output 3	Empty
Output 4	-
Output 5	End of bagging
E	Error
Z	at Zero range (refer to par. [117])
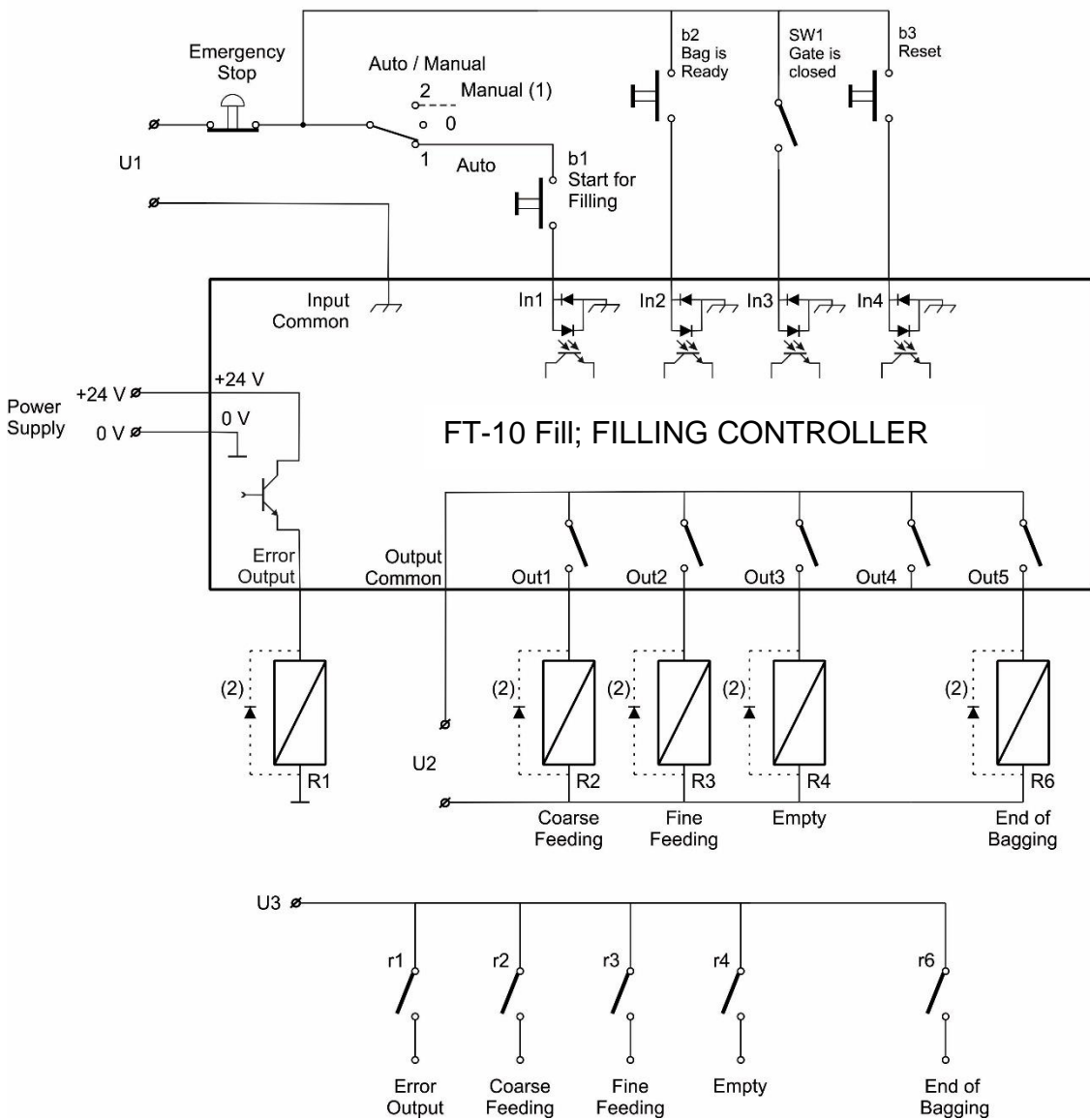
Example of a connection diagram

$^{(1)}$ Manual control circuitry is not indicated.

$^{(2)}$ Very important : If Outputs are supplied DC, reverse diodes should always be installed.

5.7 Mode 7: Weight-in / Weight-out
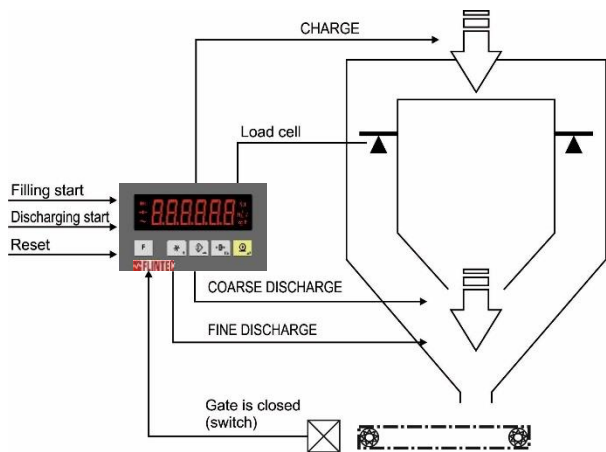
Typical Applications

- Filling of materials, which has high viscosity
- Multi-scale batching systems which are feeding the conveyor or mixer by measuring at discharge.

Operation
Filling:

- Apply filling start input for weighing- in.
- One speed filling to the ([**EXtrA**] + Target).
- End of filling output is activated and [Full] prompt is displayed.

Discharging;

- Apply discharge start input.
- Feeding is done in 2 speeds after feeding gate checking.
- End of discharge output is activated after end of discharge.

Mode Related Filling Parameters:
The mode related filling parameters shall be entered before starting up the filling. Please enter the values below carefully for better filling performance of the filling machine.

| Display	Operation
[**123.456** kg]	Press long ✱ key, [**EXtrA**] message appears.
[**EXtrA**]🔄 [XXXXX]	**Extra weight** Enter the value, that will remain on the scale after discharging. Weight-in = Target + Extra Enter the value by pressing ⬦ and +0 keys. Press the ⊙ key enter the next parameter.
[**GAT_Ch**]🔄 [X]	**Feeding gate position check** 0 = No gate switch 1 = Gate switch function is enabled Enter gate position check value by pressing ⬦ and +0 keys. Press the ⊙ key to go back to the operation. Default is "0".

Mode 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
[**ChArGE**]	Displayed at the beginnig of filling for 1 second.
[**FuLL**]🔄 [XXXXX]	Announces the end of filling until discharge.
[**dSChrG**]	Displayed at the beginnig of discharge for 1 second.
[**E tArE**]🔄 [XXXXX]	This message appears if Taring is not possible. For example, if the weight is negative or scale is not stable. It is shown alternately by the weight value. When the conditions become normal, error is acknowledged by Start Input.

[E GAtE]	Feeding gate position error. Gate is not close.
[No FEEd]	Feeding error message appears if weight value is not increased after feeding output is activated. Refer to parameter [**508**].
[FɪLL t]	This prompt announces that the filling is not finished in the filling time and is ended. Error is cancelled by Reset input. Refer to parameter [**509**].
[E trGt]	The weight is less than discharging target. Error is cancelled by Reset input.

Filling cycle:

Feeding gate will be checked continuously at discharging. If the gate is open at discharging, the discharging will stop until feeding gate will be closed.

Digital Inputs and Outputs Connection :

I / O	Descriptions
Input 1	Start for filling
Input 2	Start for discharging
Input 3	Gate is closed (0 = Open, 1=Closed)
Input 4	Reset
Output 1	Coarse discharge
Output 2	Fine discharge
Output 3	Fill
Output 4	End of filling (Full)
Output 5	End of discharging
E	Error
Z	In zero range (refer to par. [**117**])

Example of a Connection Diagram:

5.8 Mode 8: Filling into the Bag

Bag filling on the platform	Bag filling by hanging the bag

Mode Related Filling Parameters:
The mode related filling parameters shall be entered before starting up the filling. Please enter the values below carefully for better filling performance of the filling machine.

Display	Operation
[**123.456** kg]	Press long [*] key, [**vibon**] message appears.
[**vibon**] ↻ [XXXXX]	**Start of vibration** The vibration starts if the load will be heavier than the value at filling. Enter the value by pressing [ ] and [+0] keys. Press the [Ω] key to enter the next parameter.
[**ViboFF**] ↻ [XXXXX]	**Stop of vibration** The vibration stops if the load will be heavier than this value at filling. Enter the value by pressing [ ] and [+0] keys. Press the [Ω] key to enter the next parameter.
[**d_hoLd**] ↻ [XX.X]	**Delay to catch the bag** The bag catch output is activated at the end of this delay after start input received. The maximum is 25.0 seconds. Enter the value by pressing [ ] and [+0] keys. Press the [Ω] key to go to the next parameter.

Display	Operation
[**d_End**]↻ [XX.X]	**Delay to release the bag** The bag catch output is released at the end of this delay after feeding of bag stopped. The maximum is 25.0 seconds. Enter the value by pressing ⬜ and ⬜ keys. Press the ⬜ key to enter the next parameter.
[**Gr-Net**]↻ [XXXXX]	**Gross or Net filling** 0 = Filling in gross. Zeroing manually. 1 = Zeroing the display after bag has been catched. (refer to parameter [**505**]) 2 = Net filling. Enter the value by pressing ⬜ and ⬜ keys. Press the ⬜ key to enter the next parameter. Default is "0".

Mode 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
[**StArt**]	Displayed from start input to the holding the bag output activating.
[**HoLd**]	Displayed during the bag catching. If bag clamp is not closed in 5 seconds, the " **E CLMP** " prompt will appear.
[**-Zero-**]	The prompt to indicate the zeroing process. Refer to parameter [**506**].
[**FuLL**]↻ [XXXXX]	Displayed end of the filling until bag clamp opening.
[**E ZEro**]↻ [XXXXX]	The zeroing error message. The scale might be unstable or out of the zeroing range. Refer to parameter [**203**]) or parameter [**206**]. Press enter key to erase the Error message. Applying the start input, the filling will be started even the zeroing is not available.
[**E CLMP**]	Bag holder error. Appears if the bag holder is not closed in 5 seconds.
[**E tArE**]↻ [XXXXX]	Taring error. Appears if the taring is not done due to instability or negative gross weight indication. The process restarted after start entry.
[**nO FEEd**]	Feeding error. Displayed if the weight is not increased during feeding the bag. Refer to Parameter [**508**].
[**FiLL t**]	Filling time error. The filling stops if the filling will not be finished in given maximum filling time. Apply reset to erase the error. Refer to parameter [**509**].

Filling cycle:
- Apply start at ready status to catch the bag.
- The feeding is started after receiving "bag is catched "input.
- At the end of feeding "**d_End**" period is started for settling the product in the bag before releasing the bag.
- The bag catcher is open.
- Vibration to the bag can be applied between to weight values during filling.

Digital Inputs and Outputs:

I / O	Description
Input 1	Filling start
Input 2	-
Input 3	Bag is catched (Normally open)
Input 4	Reset
Output 1	Coarse feed
Output 2	Fine feed
Output 3	Vibration
Output 4	End of filling
Output 5	Catch the bag
E	Error
Z	In zero range (refer to par. [**117**])

6. FILLING TARGET AND PRESET VALUES ENTRY

Filling related target, coarse lead in and fine lead in values are entered by pressing < [*] > key **shortly**. The functionality is shown in the diagram below.
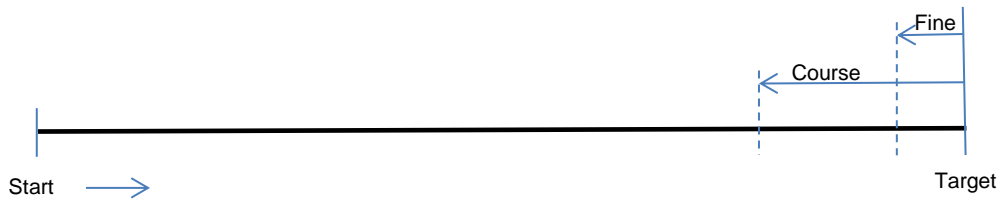
Follow the table below to insert the values.

Display	Operation
[**123.456** kg]	Press [*] key **shortly** to enter the menu. [**tArGEt**] prompt will appear..
[**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 (Please look Figure Figure 5.1) 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.*

7. FILLING BLOCK [5--]

Meaning of the parameters on the filling cycle diagram

In this diagram, the instrument do not follow the weight during coarse and fine feeding control delay periods to increase the reliability of the system; and read the actual weight value at the end of settling time for cut-off point adjustment.
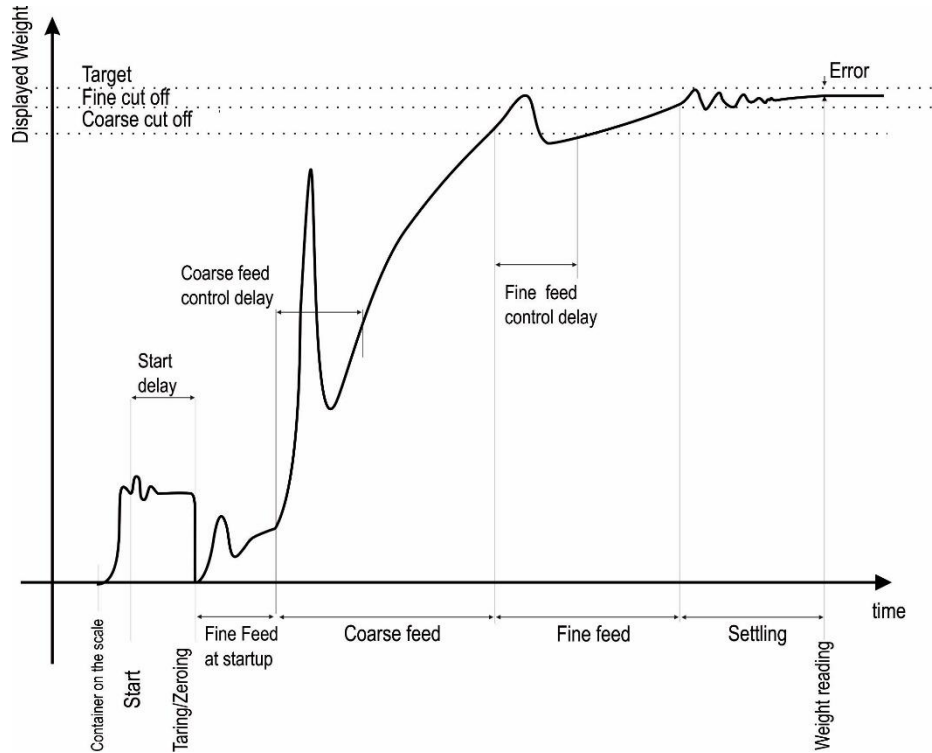
Figure 7.1 - Typical filling diagram (displayed weight vs. time)

[50-] Filling Parameters
In this section, mode selection is done and the main filling parameters to configure the device are defined.

[500 1] Filling Mode Selection
1: Mode 1 (Open container filling as Gross)
2: Mode 2 (Open container filling as Net)
3: Mode 3 (Bung-Type container filling as Gross)
4: Mode 4 (Bung-Type container filling as Net)
5: Mode 5 (Packing / Bagging)
6: Mode 6 (Multicycle packing / bagging)
7: Mode 7 (Weight-in / Weight-out)
8: Mode 8 (Filling into the bag)

[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 FILL 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:

New fine lead in = Fine lead in + (Actual – Target) * Preact Correction Factor/100

[503 01] Preact Correction Frequency

FT-10 FILL can adjust the fine value according to filling error of previous filling cycle.
The preact adjustment is applied after every number of filling cycles which is entered in this parameter (up to 99) to decrease the filling time. The new fine value is calculated according to entered rate in the parameter [**502**].
For example, if the value of this parameter is 3, preact correction is being done after every 3 filling cycles.
This parameter should be programmed as "1" for common applications. Otherwise, the entered target value is accumulated instead of the actual value at the cycles which has not preact correction.

Warning : Stability control for preact correction and accumulation the actual weight delays the actual weight reading after settling the scale only at the preact correction frequency.

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

Warning : Preact correction, filling data output needs settling time for correct result. Adjust parameter [503] as 1 and parameter [502] as 0 for printing out without preact correction.

[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 the 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   0] Feeding Check
0 : Disabled.
1 : If there is no material flow for 10 seconds, [**nO FEEd**] message is displayed. Statuses of feeding outputs do not change. The message disappears automatically after starting the feeding.
2 : If there is no material flow end of 10 seconds, [**nO FEEd**] message is displayed and the feeding is stopped. The error is cancelled by Reset input.

[509   0] Filling Time
[XXXXXX]
If the filling / discharging time exceeds this period, [**FiLL   t**] message appears and filling is stopped. The error message is cancelled by Reset input. To disable filling time control, enter [000000] value. Maximum value is 9999 seconds.

[50A   0] Start Type (for Mode-5 and Mode-6)
This parameter defines the start type of filling after power on the instrument or after reset the filling.

0 : Enable to check the zero range [**Zero_r**] at power on or after reset.
1 : Disable to check the zero range [**Zero_r**] at power on or after reset.

[50B   0] Indication in Filling Process

0 : Increasing   1 : Decreasing

8. SERIAL DATA OUTPUTS

FT-10 FILL 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.

8.1 Continuous Data Output

Continuous data output of the instrument is transmitted in the following data structure. The serial ports of FT-10 FILL 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 FILL; 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			
1	0	0	XXXXXO	0	1	X 2			
0	1	0	XXXXXX	1	1	X 5			
1	1	0	XXXXX.X				Always 1	Always 1	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.*

8.2 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)

8.3 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 <**Print**> 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			
MSD	LSD	SP	MSD	LSD	SP	MSD	LSD	SP	MSD	LSD	LF	CR
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 <**Enter**> 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   Multi Line-16 Format

8.4 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:
 [ADR][COMMAND][CHK][CR][LF]

Response format with weight:
[ADR][COMMAND][STATUS][SIGN][WEIGHT][CHK][CR][LF]
Response format without weight / force
[ADR][COMMAND][STATUS][CHK][CR][LF]

Command Table:

A	Read all weight data immediately
B	Read Gross weight value immediately
C	Clear the tare memory
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.

F	Start /stop continuous data output

Command: [ADR][F][ENABLE/DISABLE]
Response: [ADR][F][STATUS]
Example:
      Command: 01F1   (Enable)
                  01F0   (Disable)
      Response: 01FA   (Command is done successfully)
                  01FN   (Command could not be executed)

<u>Comments</u>: Indicated weight value sends continuously.
Continuous data format is [ADR][I][STATUS][SIGN][WEIGHT VALUE].

G	Read voltage value of DC power supply

Command: [ADR][G]
Response: [ADR][G][STATUS][VOLTAGE VALUE]
Example:
      Command: 01G
      Response: 01GA234   (Power supply is 23.4 VDC)
                  01GA150   (Power supply is 15.0 VDC)
                  01GA090   (Power supply is 9.0 VDC)

<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)

Comments : Indicated weight value (stable or dynamic) is transmitted immediately.

The weight value may be in gross or net.

P	Print :Read the stable weight

Command: [ADR][P]

Response: [ADR][P][STATUS][SIGN][WEIGHT VALUE]

Example:

     Command: 01P

     Response: 01PS+000123.4   (weight is stable and 123.4) or

01PN   (could not print)

Comments : Checks status and it must be stable. Else Nack status is send.

Status can be Stable or Nack.

S	Read Status

Command: [ADR][S]

Response: [ADR][S][STATUS-1][STATUS-2][STATUS-3]

Example:

     Command : 01S

     Response : 01SSGI   (Stable, Gross, In Range)

             01SDGL   (Dynamic, Gross, Low voltage error)

Comments:

The response includes 3 status information.

STATUS-1 can be **S**table or **D**ynamic.

STATUS-2 can be **G**ross or **N**et.

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

T	Tare

Command: [ADR][T]

Response: [ADR][T][A]   (Taring is done successfully, and scale is in net)

               [ADR][T][N]   (Taring could not be executed)

               [ADR][T][X]   (Taring is disabled)

Comments: The tare value is overwritten by the new tare weight value.

Status must be stable in 2 seconds time out delay. If so, Ack is send.

If it cannot be stable in time out delay, Nack is send.

U	Read digital inputs

Command: [ADR][U]

Response: [ADR][U][A][Inputs]

Example:

    Command : 01U

    Response : 01UA03   (Input 2 and Input 1 are active)

                  01UA4296   (Input 15,10,8,5,3,2 are active)

                  01UAFF   (All 8 inputs are active)

                  01UN   (Could not read inputs)

Comments: Data length change according to number of digital inputs.

Inputs are implemented to ASCII char of 4-bit. '1111' inputs are implemented to char 'F'.

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

V	Read digital outputs

Command: [ADR][V]

Response: [ADR][V][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'

9. MODBUS RTU

FT-10 FILL 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;

9.1 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 29). Functions code '0x03' (Read Holding Registers) and '0x10' (Preset Multiple Regs) 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 28.

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 (ref. 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)			

				Dec	Description		
40009	R/W	1	Control	0	None		
				1	Zero		
				2	Tare		
				3	Clear		
				4	Print		
				8	Start for filling		
				9	Reset		
				14	Start for emptying		
40010	R/W	1	Not used				
40011	R/W	2	Target value	Refer to page 68			
40013	R/W	2	Not used				
40015	R/W	2	Coarse value	Refer to page 68			
40017	R/W	2	Fine value	Refer to page 68			
40019	R/W	1	CN (Label number)	Refer to parameter [142] on page 33			
40020	R	2	Last filling value				
40022	R/W	1	Quantity				
40023	R/W	2	Total				
40025	R	1	Status of Inputs	Bit	Description		
				D0	Input 1	0 – Passive	
				D1	Input 2	1 - Active	
				D2	Input 3		
				D3	Input 4		
40026	R/W	2	Digital outputs status	D0	Output 1	0 – Passive	
				D1	Output 2	1 - Active	
				D2	Output 3		
				D3	Output 4		
				D4	Output 5		
				D5	Output 6		
				D6	Output 7		
				D7	Output 8		
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 [1]		
				171	Dead Load [1]		
				23205	Save the coefficients of eCal		
40031	R/W	2	Span Calibration Value / LC capacity / mV value / Dead load value				
40033	R	1	Calibration Status		Dec	Description	

				D0 .. D7 Calibration Process Status	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 - 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			

			Process parameters					
			Mode 1 Mode 2	Mode 3 Mode 4	Mode 5	Mode 6	Mode 7	Mode 8
40040	R/W	2	TARE⁻⁻	TARE⁻⁻	D_DISC	D_DISC	Not used	VibON
40042	R/W	2	TARE__	TARE__	D_GATE	D_GATE	Not used	VibOFF
40044	R/W	2	D_FILL	D_FILL	ZERO_R	ZERO_R	EXTRA	D_Hold
40046	R/W	2	Not used	SAFEtY	Not used	L_TRGT	Not used	Gr-Net
40048	R/W	2	D_STRT	D_STRT	Not used	Not used	Not used	D_End
40050	R/W	2	S_TYPE	S_TYPE	Not used	Not used	Not used	Not used
40052	R/W	2			GAT_Ch	GAT_Ch	GAT_CH	Not used

Register	R/W	Count	Description	
40054	R/W	17	Not used	
40071	R	1	Actual weight (Net if the indication is in Net)	(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. e.g.: 23.4 VDC is indicated as integer 234 value.		
40101	R	2	Ton/hour indication			
40103	R	10	Not used			

				Dec	**Description**
40113	R	1	Process Warning Messages	0	No process error
				1	END
				2-3	Not used
				4	RESET
			Process Error Messages	128	E GATE
				129	E TRNG
				130	E TARE
				131	E ZERO
				132	E ZRNG
				133	FiLL t
				134	E VALV
				135	E HOLE
				136	Not used
				137	NO 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

42000	R/W	1	Filter	Refer to parameter [120] on page 33	
42001	R/W	1	Not used		
42002	R/W	1	Zeroing Range	Refer to parameter [203] on page 34	
42003	R/W	1	Auto Zero Tracking	Refer to parameter [204] on page 34	
42004	R/W	1	Tare	Refer to parameter [205] on page 34	
42005	R/W	1	Motion Detector	Refer to parameter [206] on page 34	
42006	R/W	2	Not used		
42008	R/W	2	Capacity	Refer to parameter [212] on page 34	

				Dec	**Description**
42010	R/W	1	Decimal point	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
42100	R/W	1	Filling mode selection		Refer to parameter [500] on page 69	
42101	R/W	1	Feeding type		Refer to parameter [501] on page 69	
42102	R/W	1	Preact correction factor		Refer to parameter [502] on page 69	
42103	R/W	1	Preact correction frequency		Refer to parameter [503] on page 69	
42104	R/W	1	Check delay		Refer to parameter [504] on page 70	
42105	R/W	1	Zeroing period		Refer to parameter [505] on page 70	
42106	R/W	1	Zeroing delay		Refer to parameter [506] on page 70	
42107	R/W	1	Indication at the end of filling		Refer to parameter [507] on page 70	
42108	R/W	1	Feeding check		Refer to parameter [508] on page 70	
42109	R/W	1	Filling time		Refer to parameter [509] on page 70	
42110	R/W	1	Start Type		Refer to parameter [50A] on page 70	
42111	R/W	1	Indication in filling process		Refer to parameter [50B] on page 72	

(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

10. PROFIBUS (ONLY FT-10 FILL 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 FILL PB controller, you can communicate with the instrument. The **GSD** file is available under **www.flintec.com**.

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

This sub-block includes the parameters related with the Profibus interfaces of FT-10 FILL 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 FILL will be entered via keypad between 001 to 126.

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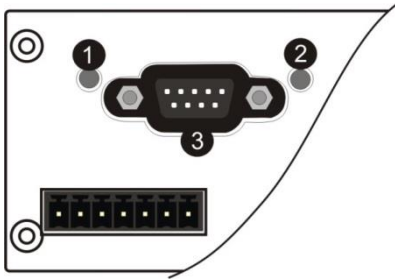
1	OP Operation mode LED
2	ST Status LED
3	Profibus Connector

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

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.

10.1 Data Format

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

10.2 GSD / GSDML Configuration

Profibus / Profinet data consists of 2 x Input 2 words and 2 x Output 2 words.
GSD configuration for PLC programmers is shown in Figure 10.1.
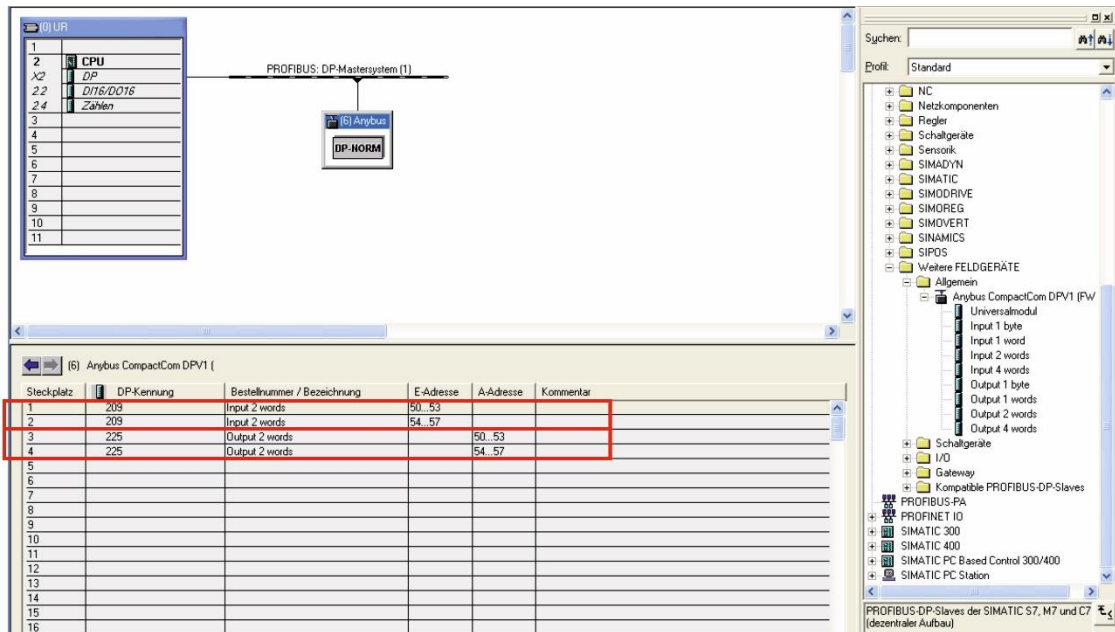
Figure 10.1 – GSD / GSDML Configuration

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

10.3 Profibus DP / Profinet Data Structure

11. PROFINET (ONLY FT-10 FILL PN)

The Profinet interface operates at 100Mbit, full duplex, as required by Profinet.

The **GSDML** file is available on Internet **www.flintec.com.**

Attention: There are two different GSDML, v2.2 OR v2.3 files depending on Profinet version.

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

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

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

This sub-block includes the parameters related with the Profinet interfaces of FT-10 FILL 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 indicate the interface status as seen below. The meanings of these LED's are;
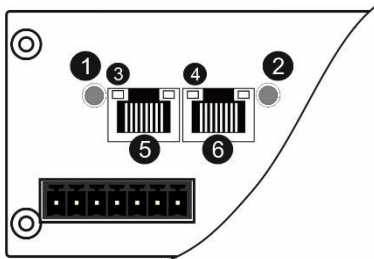
1	NS Network Status LED
2	MS Module Status LED
3	Link/Activity LED (port 1)
4	Link/Activity LED (port 2)
5	P1 Profinet interface (port 1)
6	P2 Profinet interface (port 2)

MS Module Status LED

LED State	Description	Comment
Off	Not power or not initialized	No power or profinet module is in initialization state
Green	Normal operation	
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	Device 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

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)	-

11.1 Data Format

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

11.2 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 on CD which is supplied together with the instrument and under 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 ' '.

11.3 GSDML Configuration and Data Structure

Profinet data structures of FT-10 FILL PN include 2 x Input 2 words and 2 x Output 2 words.

For Data Structure for Profinet see Appendix, **page 118**

GSDML configuration for PLC programmers, same as for Profibus, is shown on Page 84.

Ethernet output of FT-10 FILL EN is programmable to BSI command set, Continuous data output, Fast continuous data output, odbus 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 73	
Continuous	Refer to Page 71	-
Fast Continuous	Refer to Page 72	-
Modbus TCP High-Low	Modbus TCP interfacing. Refer to Page 90.	Interfacing with PLC.
Modbus TCP Low-High	Modbus TCP interfacing. Refer to Page 90.	Interfacing with PLC.

Table 12.1 - Ethernet output interfacing

You can communicate with the controller after programming Ethernet TCP/IP and Modbus TCP related parameters [**03-**] on Page 30.

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

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

[030   5] Data Format

0   : No data transfer.
1   : Continuous data output   (Page 71)
2   : Print mode   (Parameter [040]   (Page 31)
3   : BSI command set   (Page 73)
4   : Modbus TCP High-Low (*)   (Page 90)
5   : Modbus TCP Low-High (*)   (Page 90)
6   : Fast continuous mode   (Page 72)

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

[031 001] Device Address
The address of FT-10 FILL will be entered between 01 to 255.

[032   ] IP Address
The IP address will be entered as " aaa.bbb.ccc.ddd ". Default is "192.168.16.250".

For changing the IP address, press the <**Tare**> key and enter the first 3 "a" digits of the IP address. Press <**Enter**> 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 <**Tare**> key and enter the first 3 "a" digits of the IP address. Press <**Enter**> 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 <**Tare**> key and enter the first 3 "a" digits of the IP address. Press <**Enter**> 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 RTU Answer is sent immediately after Request is received.

1   : Modbus RTU Answer is delayed 20 msec after Request is received.

2   : Modbus RTU Answer is delayed 50 msec after Request is received.

This property is very helpful for slow PLC systems

12.1 Ethernet Setup

There are 11 parameters for Ethernet network and Ethernet set up is done by IndFace1x (EtherX PC) software over Local Network Area as described in this section or you can entry from par. [**03-**] blocks. EtherX PC software is available in 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: Default password is **123456**

12.2 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 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 30.

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)			

				Dec	Description		
40009	R/W	1	Control	0	None		
				1	Zero		
				2	Tare		
				3	Clear		
				4	Print		
				8	Start for filling		
				9	Reset		
				14	Start for emptying		
40010	R/W	1	Not used				
40011	R/W	2	Target value	Refer to page 68			
40013	R/W	2	Not used				
40015	R/W	2	Coarse value	Refer to page 68			
40017	R/W	2	Fine value	Refer to page 68			
40019	R/W	1	CN (Label number)	Refer to parameter [142] on page 33			
40020	R	2	Last filling value				
40022	R/W	1	Quantity				
40023	R/W	2	Total				
40025	R	1	Status of Inputs	**Bit**	**Description**		
				D0	Input-1		
				D1	Input-2	0 – Passive	
				D2	Input-3	1 - Active	
				D3	Input-4		
40026	R/W	2	Status of Outputs	D0	Output-1		
				D1	Output-2		
				D2	Output-3		
				D3	Output-4	0 – Passive	
				D4	Output-5	1 - Active	
				D5	Not used		
				D6	Error		
				D7	Zero range		
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 [1]		
				171	Dead Load [1]		
				23205	Save the coefficients of eCal		
40031	R/W	2	Span Calibration Value / LC capacity / mV value / Dead load value				

					Dec	Description
40033	R	1	Calibration Status	D0 .. D7 Calibration Process Status	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 - Check load cell connections
					36	Calibration load value entry Error - Test weight is too small. Increase the test weight
					37	Scale unstable - Wait until scale become stable - Check grounding wiring
					38	The Calibration DIP switch is not 'On' position. - Check the calibration DIP switch.
40034	R/W	6	Not used			

			Process parameters					
			Mode 1 Mode 2	Mode 3 Mode 4	Mode 5	Mode 6	Mode 7	Mode 8
40040	R/W	2	TARE⁻⁻	TARE⁻⁻	D_DISC	D_DISC	Not used	VibON
40042	R/W	2	TARE__	TARE__	D_GATE	D_GATE	Not used	VibOFF
40044	R/W	2	D_FILL	D_FILL	ZERO_R	ZERO_R	EXTRA	D_Hold
40046	R/W	2	Not used	SAFETY	Not used	L_TRGT	Not used	Gr-Net
40048	R/W	2	D_STRT	D_STRT	Not used	Not used	Not used	D_End
40050	R/W	2	S_TYPE	S_TYPE	Not used	Not used	Not used	Not used
40052	R/W	2	Not used	Not used	GAT_Ch	GAT_Ch	GAT_Ch	Not used

40054	R/W	17	Not used	
40071	R	1	Actual weight (Net if the indication is in Net)	(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)

					Dec	Description
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			
40103	R	10	Not used			
40113	R	1	Process Warning Messages		Dec	Description
					0	No process error
					1	END
					2-3	Not used
					4	RESET
			Process Error Messages		128	E GATE
					129	E TRNG
					130	E TARE
					131	E ZERO
					132	E ZRNG
					133	FILL t
					134	E VALV
					135	E HOLE
					136	Not used
					137	NO 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
42000	R/W	1	Filter	Refer to parameter [120] on page 33		
42001	R/W	1	Not used			
42002	R/W	1	Zeroing Range	Refer to parameter [203] on page 34		
42003	R/W	1	Auto Zero Tracking	Refer to parameter [204] on page 34		
42004	R/W	1	Tare	Refer to parameter [205] on page 34		
42005	R/W	1	Motion Detector	Refer to parameter [206] on page 34		
42006	R/W	2	Not used			
42008	R/W	2	Capacity	Refer to parameter [212] on page 34		
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
42100	R/W	1	Filling mode selection	Refer to parameter [500] on page 69	
42101	R/W	1	Feeding type	Refer to parameter [501] on page 69	
42102	R/W	1	Preact correction factor	Refer to parameter [502] on page 69	
42103	R/W	1	Preact correction frequency	Refer to parameter [503] on page 69	
42104	R/W	1	Check delay	Refer to parameter [504] on page 70	
42105	R/W	1	Zeroing period	Refer to parameter [505] on page 70	
42106	R/W	1	Zeroing delay	Refer to parameter [506] on page 70	
42107	R/W	1	Indication at the end of filling	Refer to parameter [507] on page 70	
42108	R/W	1	Feeding check	Refer to parameter [508] on page 70	
42109	R/W	1	Filling time	Refer to parameter [509] on page 70	
42110	R/W	1	Start Type	Refer to parameter [50A] on page 70	
42111	R/W	1	Indication in filling process	Refer to parameter [50B] on page 70	

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

Programming steps of frequent use ……

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

13. CANOPEN (ONLY FT-10 FILL CO)

After setting related parameters to can communicate with the controller via CANopen network. EDS file is available in CD which is supplied together with the instrument.

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;
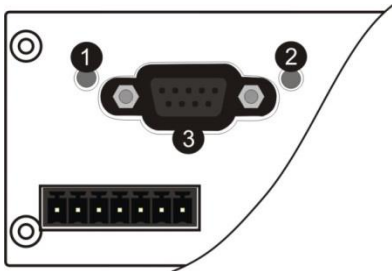
1	Run LED
2	Error LED
3	CANopen interface

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 baud rate 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.

13.1 Data Format

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

13.2 EDS Configuration

CANopen data structures of FT-10 FILL CO includes 1 x TxPDO (64 bit) and 1 x RxPDO (64 bit). EDS configuration for PLC programmers is shown in Figure 13.1.
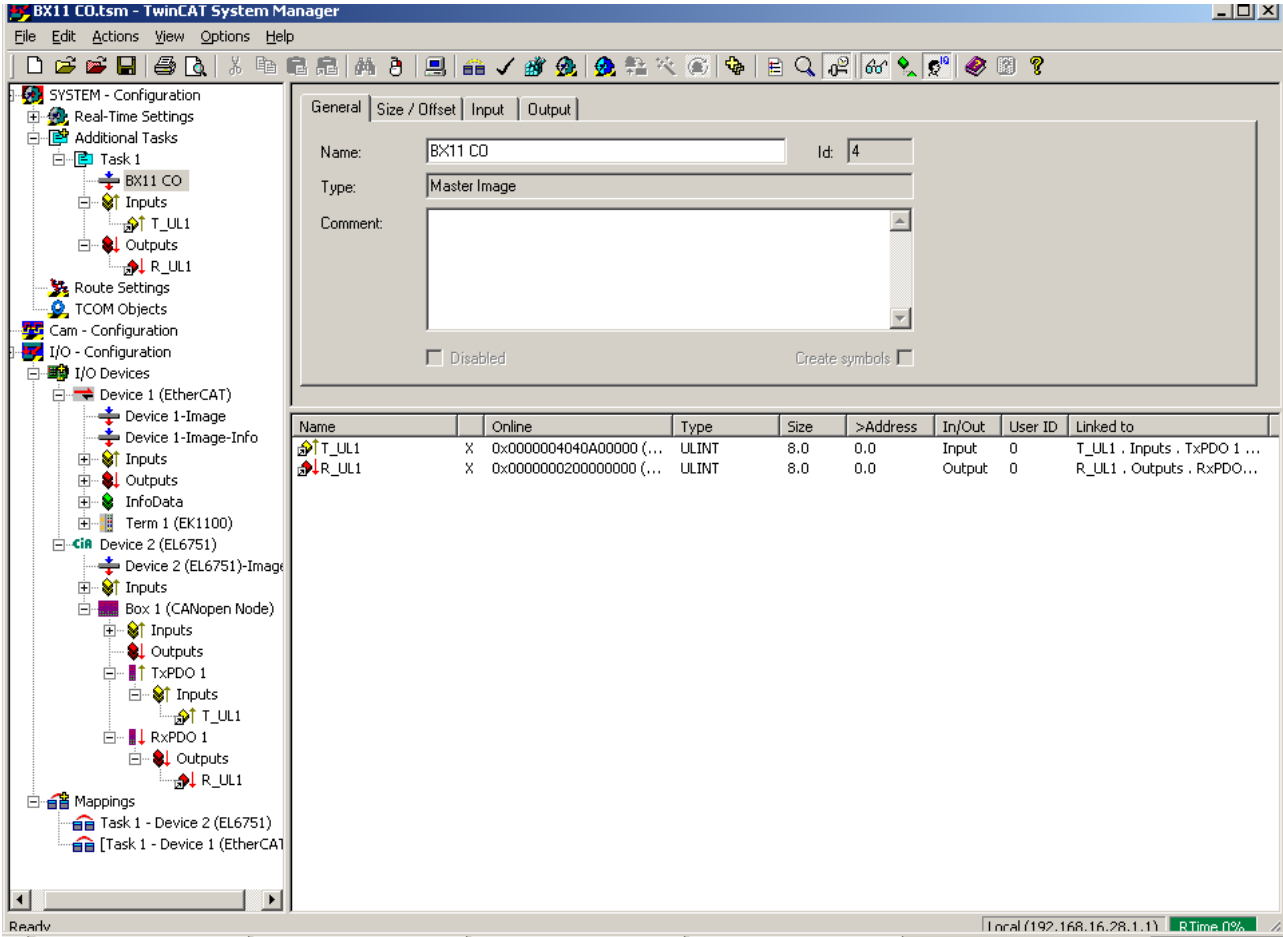
Figure 13.1 - EDS Configuration

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

13.3 CANopen Data Structure

FT-10 FILL 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

	Zero range	Error		Out 5	Out 4	Out 3	Out 2	Out 1					In 4	In 3	In 2	In 1
TxPDO 1 (T_UL1)	Error codes of FT-10 FILL CO					Process Error		Centre of zero	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 FILL 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)		
		Bin	**Dec**	**Descriptions**
		0000	0	No error found
		0001	1	ADC out
	Error Codes of FT-10 FILL CO	0010	2	ADC over
D47 … D44		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 in zero range
		1		Weight is out of zero range
D39	Indication	0		Gross
		1		Net
D38	MD – Motion Detection	0		Stable
		1		Dynamic
		Bin	**Dec**	**Descriptions**
		00000	0	Actual weight (Net if the indication is in Net)
	Read Command Response	00001	1	Gross weight
D37 … D33		00010	2	Tare weight
		00011	3	Calibration Status (Refer to Table 13.2)
		00100	4	Not used

		Bin	Dec	
		10000	16	
		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
		11010	26	Inputs status always integer)
		11011	27	Outputs status (always integer)
		11100	28	Ton / hour indication
		11101	29	Not used
		11110	30	Process error messages (Refer to Table 13.1)
		11111	31	Use the Expanded Command list (Refer to Table 13.3)
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 FILL 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
D7 ... D0	Process Warning Messages	**Bin**	**Dec**	**Messages**
		00000000	0	No process error
		00000001	1	END
		00000010	2	Not used
		00000011	3	
		00000100	4	RESET
	Process error Messages	10000000	128	E GATE
		10000001	129	E TRNG
		10000010	130	E TARE
		10000011	131	E ZERO
		10000100	132	E ZRNG
		10000101	133	FILL t
		10000110	134	E VALV
		10000111	135	E HOLE
		10001000	136	Not used
		10001001	137	NO FEED

Table 13.1– 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 FILL 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 FILL 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 13.2 - Calibration status

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	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 FILL 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 … D56	Not used				
D55 … D48	Expanded Commands List (Refer to Table 13.3)				
D47 ... D43	Not used				
D42 … D38	Command List	**Bin**	**Dec**	**Commands**	
		00000	0	None command is activated	
		00001	1	Zero	
		00010	2	Tare	
		00011	3	Clear	
		00100	4	Print	
		00101	5	Adjust zero calibration	Calibration
		00110	6	Adjust span calibration [1]	
		00111	7	Total Load Cell Capacity [1]	eCal Coefficients
		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]
		11010	26	Not used
		11110	30	
		11111	31	Use the Expanded Command list (Refer to Table 13.3)
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 13.2)
		00100	4	Not used
		10000	16	
		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
		11010	26	Inputs status (always integer)
		11011	27	Outputs status (always integer)
		11100	28	Ton / hour indication
		11101	29	Not used
		11110	30	Process error messages (Refer to Table 13.1)
		11111	31	Use the Expanded Command list (Refer to Table 13.3)
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	Bin	Dec	Commands					
				Bin →	**Dec** →	**Commands**			
D48…D55	Expanded Commands List	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					

Process parameters(1):

Bin	Dec	R/W	Mode-1 Mode-2	Mode-3 Mode-4	Mode-5	Mode-5	Mode-6	Mode-7
00100000	32	R/W	TARE⁻⁻	TARE⁻⁻	D_DISC	D_DISC	Not used	VibON
00100001	33	R/W	TARE__	TARE__	D_GATE	D_GATE	Not used	VibOFF
00100010	34	R/W	D_FILL	D_FILL	ZERO_R	ZERO_R		D_Hold
00100011	35	R/W	Not used	SAFETY	Not used	L_TRGT	Not used	Gr-Net
00100100	36	R/W	D_STRT	D_STRT	Not used	Not used	Not used	D_End
00100101	37	R/W	S_TYPE	S_TYPE	Not used	Not used	Not used	Not used
00100110	38	R/W	Not used	Not used	GAT_Ch	GAT_Ch		Not used

Bin	Dec	R/W	Commands	Details
00100111 / 00111111	39 / 63		Not used	
01000000	64	R/W	Filter(1)	Refer to par. [120], page 33
01000001	65		Not used	
01000010	66	R/W	Zeroing Range(1)	Refer to par. [203], page 34
01000011	67	R/W	Auto Zero Tracking(1)	Refer to par. [204], page 34
01000100	68	R/W	Tare(1)	Refer to par. [205], page 34
01000101	69	R/W	Motion Detector(1)	Refer to par. [206], page 34
01000110 / 01000111	70 / 71		Not used	
01001000	72	R/W	Capacity(1)	Refer to par. [212], page 34
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 01011111	75 95		Not Used	
		01100000	96	R/W	Filling mode selection[(1)]	Refer to par.[500],page 69
		01100001	97	R/W	Feeding type[(1)]	Refer to par.[501].page 69
		01100010	98	R/W	Preact correction factor [(1)]	Refer to par.[502],page 69
		01100011	99	R/W	Preact correction freq. [(1)]	Refer to par.[503],page 69
		01100100	100	R/W	Check delay[(1)]	Refer to par.[504],page 70
		01100101	101	R/W	Zeroing period[(1)]	Refer to par.[505],page 70
		01100110	102	R/W	Zeroing delay[(1)]	Refer to par.[506],page 70
		01100111	103	R/W	Indcation at the end of filling[(1)]	Refer to par.[507],page 70
		01101000	104	R/W	Feeding check[(1)]	Refer to par.[508] page 70
		01101001	105	R/W	Filling time[(1)]	Refer to par.[509] page 70
		01101010	106	R/W	Start Type[(1)]	Refer to par.[50A] page 70
		01101011	107	R/W	Indication in filling proc. [(1)]	Refer to par.[50B] page 70

Table 13.3 - 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.

14. ETHERNET/IP (ONLY FT-10 FILL EI)

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

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

The EtherNet/IP interface supports 10/100Mbit, full or half duplex operation.

EDS file for two port EtherNet/IP is available under **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;
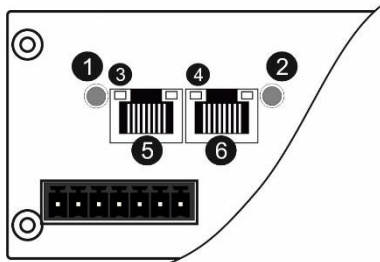
1	NS Network Status LED
2	MS Module Status LED
3	Link/Activity LED (port 1)
4	Link/Activity LED (port 2)
5	P1 interface (port 1)
6	P2 interface (port2)

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

14.1 Data Format

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

14.2 EtherNet/IP Parameters

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

DHCP

Dynamic Host Configuration Protocol automates network parameters if it is enabled.

Default is 'Enable'.

IP Address

If DHCP is disabled, obtain IP address manually.

Subnet Mask

If DHCP is disabled, obtain subnet mask manually.

Default Gateway

If DHCP is disabled, obtain default gateway manually.

Primary DNS

If DHCP is disabled, obtain primary DNS manually.

Secondary DNS

If DHCP is disabled, obtain secondary DNS manually.

Host Name

Enter a unique host name to the instrument.

Default is ' '.

14.3 EDS Configuration

EtherNet/IP data structures of FT-10 FILL includes 2 x Input 2 words and 2 x Output 2 words. EDS configuration for PLC programmers is shown in **Figure 14.1** and **Figure 14.2**.
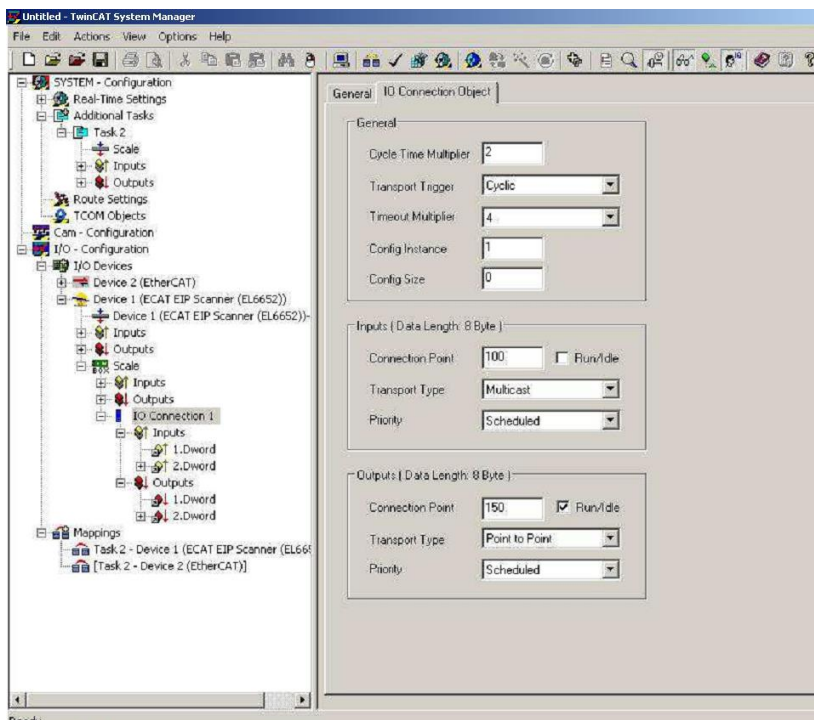
Figure 14.1 – Configuration of module properties without EDS file
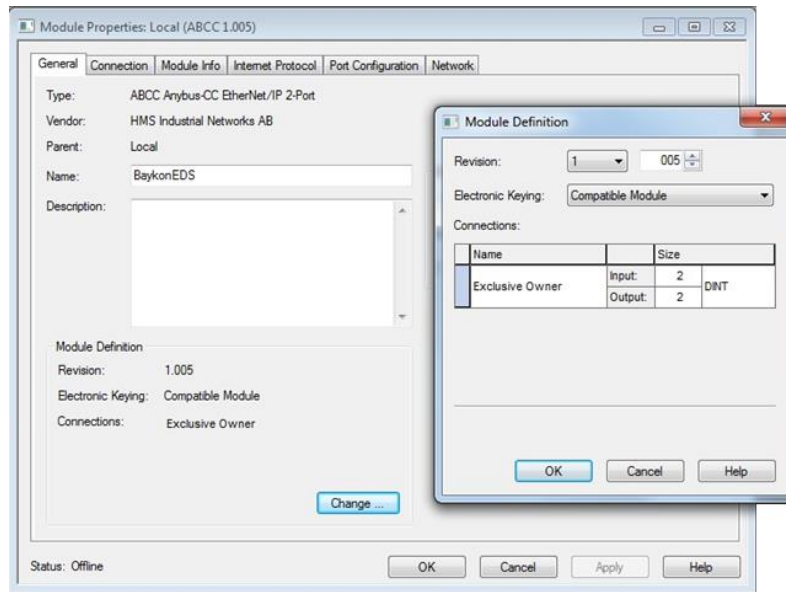
Figure 14.2 – Configuration of module properties with EDS file

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

14.4 EtherNet/IP Data Structure

For Data Structure for EtherNET/IP see Appendix, **page 118**

15. ETHERCAT (ONLY FT-10 FILL EC)

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

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

The EtherCAT interface supports 100Mbit, full duplex operation.

ESI file for two ports EtherCAT is available under **www.flintec.com.**

There are 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

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 ESI Configuration

EtherCAT data structures of FT-10 FILL includes 2 x Input 2 words and 2 x Output 2 words. ESI configuration for PLC programmers is shown in **Figure 15.1**.
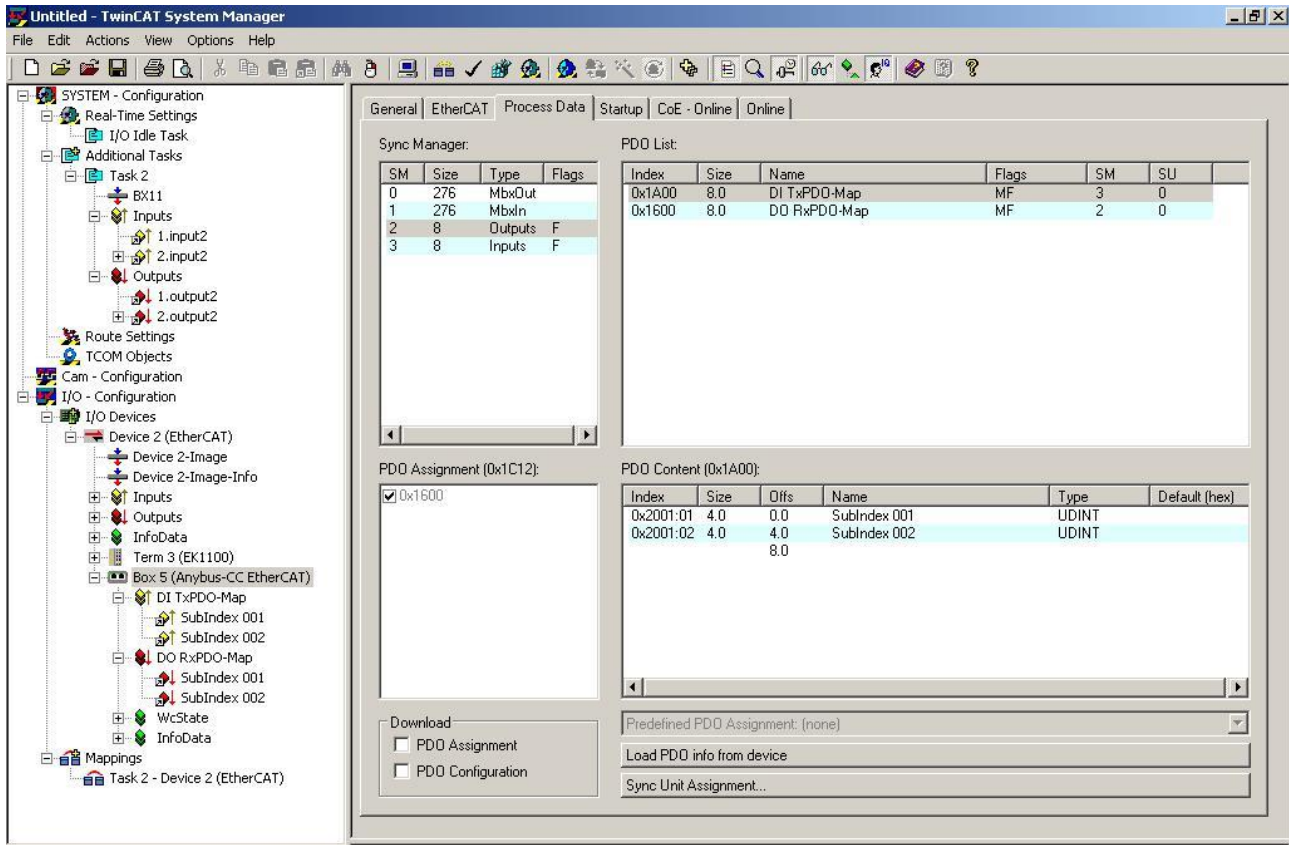
Figure 15.1 – Configuration of module properties for Beckhoff

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

15.3 EtherCAT Data Structure

For Data Structure for EtherCAT see Appendix, **page 118**

16. CC-Link (only FT-10 FILL CC)

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

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

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

[070   0] Data Format

0 : Signed 32 bit integer, no decimal point implied

1 : 32 bit float, decimal point implied

[071 000] Rack Address

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

[072 000] Baudrate

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

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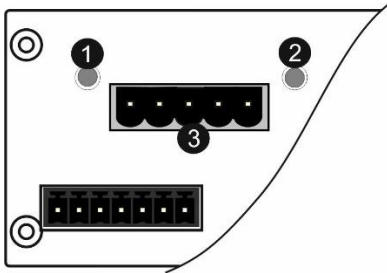
1	NS RUN LED
2	MS ERR LED
3	CC-Link interface

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.

16.1 Data Format

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

parameter [070].

16.2 CC-Link Configuration

FT-10 FILL has one occupied station area on CC-Link network and station type of FT-10 FILL must be programmed as 'Remote device station' in the PLC software. CC-Link configuration for PLC programmers is shown in **Figure 16.1**.
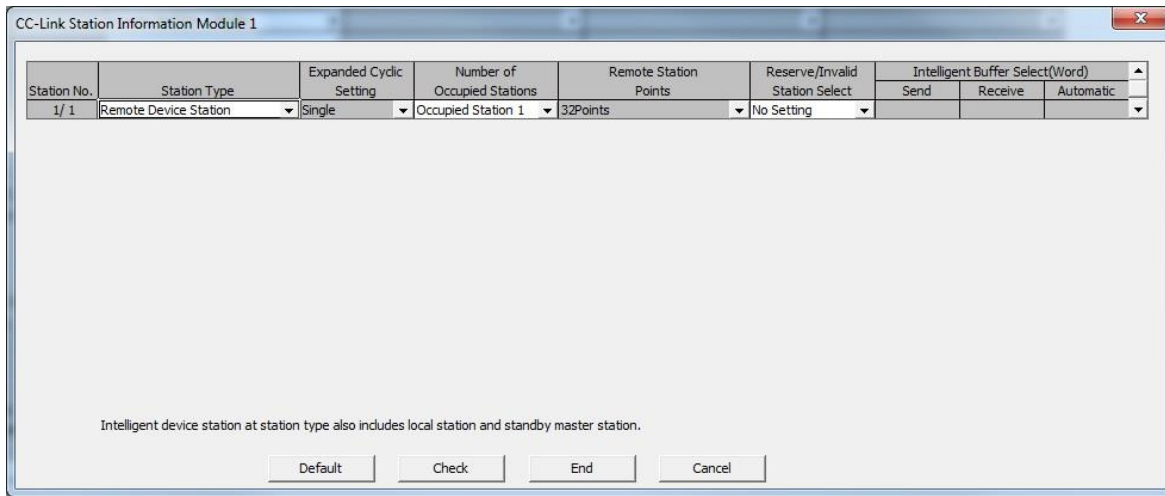
Figure 16.1 – Station information

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

16.3 CC-Link Data Structure

For Data Structure for CC-Link see Appendix, **page 118**

17. POWERLINK (ONLY FT-10FILL PL)

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

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

The Powerlink interface is 100Mbit and half duplex.

XDD file for two port Powerlink is available under **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;
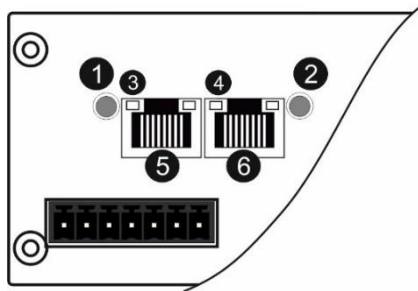
1	STS Status LED
2	Err Error LED
3	Link/Activity LED (port 1)
4	Link/Activity LED (port 2)
5	P1 interface (port 1)
6	P2 interface (port 2)

STS Status LED

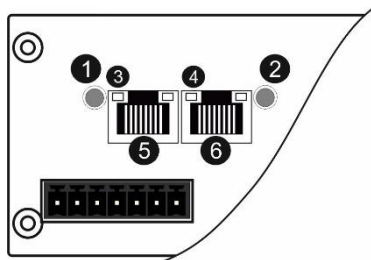| LED State	Description
Off	Module is off, initializing, or not active.
Green, fast flashing[a]	NMT_CS_BASIC_ETHERNET Basic Ethernet state: no POWERLINK traffic has been detected.
Green, single flash	NMT_CS_PRE_OPERATIONAL_1. Only asynchronous data.
Green, double flash	NMT_CS_PRE_OPERATIONAL_2. Asynchronous and synchronous data. No PDO data.[b]
Green, triple flash	NMT_CS_READY_TO_OPERATE. Ready to operate. Asynchronous and synchronous data. No PDO data.[b]
Green	NMT_CS_OPERATIONAL. Fully operational. Asynchronous and synchronous data. PDO data is sent and received.
Green, slow flashing[c]	NMT_CS_STOPPED Module stopped (for controlled shutdown, for example). Asynchronous and synchronous data. No PDO data.[b]
Red	If the ERROR LED also is red, a fatal event was encountered.

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

Err Error LED

LED State	Description
Off	No error
Red	If the STATUS LED is not red, a non-fatal error has been detected. If the STATUS LED is red, a fatal event was encountered.

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

LINK/Activity LED

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

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 XDD Configuration

Powerlink data structures consist of 2 pcs Input-2 words and 2 pcs Output-2 words. XDD configuration for PLC programmers is shown in Figure 17.1.
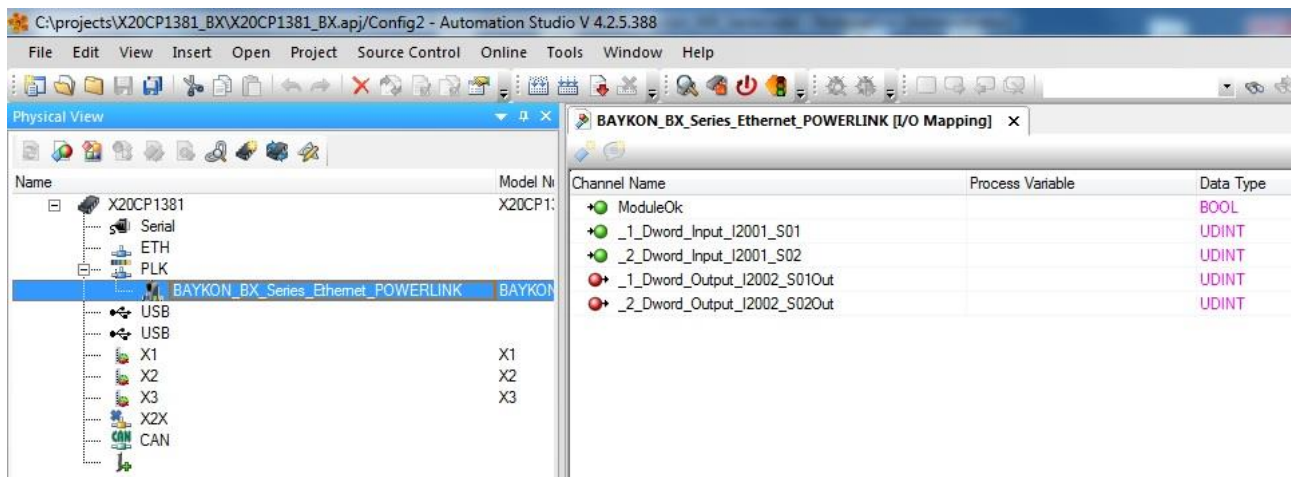
Figure 17.1 – Configuration of module properties with XDD file

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

17.3 Powerlink Data Structure

For Data Structure for **Powerlink** see Appendix, page 118

18. APPENDIX: DATA STRUCTURE PROFIBUS DP / PROFINET, ETHERNET/IP, ETHERCAT, CC-LINK, POWERLINK

FT-10 FILL Output to PLC Input

Bitwise of a Dword:

Dword	D31	D30	D29	D28	D27	D26	D25	D24	D23	D22	D21	D20	D19	D18	D17	D16
(Only read)	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	Zero Range	Error		Out 5	Out 4	Out 3	Out 2	Out 1					In 4	In 3	In 2	In 1
	Error codes of FT-10 FILL				Proce ss Error		Centr e of zero	Gross Net	MD	Read command response					Cmd Flg

FT-10 FILL 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 FT-10 FILL	**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 in out of zero range
		1		Weight is in zero range
D7	Indication	0		Gross
		1		Net
D6	MD – Motion Detection	0		Stable
		1		Dynamic
D5 … D1	Read Command Response	00000	0	Actual weight (Net if the indication is in Net)
		00001	1	Gross weight
		00010	2	Tare weight
		00011	3	Calibration Status (Refer to **Fehler! Verweisquelle konnte nicht gefunden werden.**)
		00100 / 10000	4 / 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
		11010	26	Inputs status (always integer)
		11011	27	Outputs status (always integer)
		11100	28	Ton / hour indication
		11101	29	Not used
		11110	30	Process error messages (Refer to **Fehler! Verweisquelle konnte nicht gefunden werden.**)
		11111	31	Use the Expanded Command list (Refer to **Fehler! Verweisquelle konnte nicht gefunden werden.**)
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 FILL 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
D7 ... D0	Process Warning Messages	**Bin**	**Dec**	**Messages**
		00000000	0	No process error
		00000001	1	END
		00000010	2	Not used
		00000011	3	
		00000100	4	RESET
	Process error Messages	10000000	128	E GATE
		10000001	129	E TRNG
		10000010	130	E TARE
		10000011	131	E ZERO
		10000100	132	E ZRNG
		10000101	133	FILL t
		10000110	134	E VALV
		10000111	135	E HOLE
		10001000	136	Not used
		10001001	137	NO FEED

Table 18.1– 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 FILL Input

Bit Number	1st Dword Description			
D31 … D16	Not in use			
		Bin	**Dec**	**Commands**
D15 … D8	Calibration Errors	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 FILL 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 18.2 - Calibration status

PLC Output to FT-10 FILL Input

Bitwise of a Dword:

Dword	D31	D30	D29	D28	D27	D26	D25	D24	D23	D22	D21	D20	D19	D18	D17	D16
(R/W)	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	Not used	SFE	Reset	Filling Start	Not used	Expanded Commands List
	Not in use			Command List	Read Data Selection	New CMD

PLC Output to FT-10 FILL 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 … D24	Not used			
D23 … D16	Expanded Commands List (Refer to Fehler! Verweisquelle konnte nicht gefunden werden.)			
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
		00110	6	Adjust span calibration [1]
		00111	7	Total Load Cell Capacity [1]
		01000	8	Average mV/V value [1]
		01001	9	Dead Load value [1]
		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]

(Note: the "Commands" column also contains grouping annotations: "Calibration" spanning rows 5–6; "eCal Coefficients Refer to par. [313]" spanning rows 7–9.)

		11001	25	Total [1]
		11010	26	Not used
		11110	30	
		11111	31	Use the Expanded Command list (Refer to Fehler! V erweisquelle konnte nicht gefunden werden.)
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 **Fehler! Verweisquelle k onnte nicht gefunden werden.**)
		00100	4	Not used
		10000	16	
		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
		11010	26	Inputs status (always integer)
		11011	27	Outputs status (always integer)
		11100	28	Ton / hour indication
		11101	29	Not used
		11110	30	Process error messages (Refer to **Fehler! Verweisquelle k onnte nicht gefunden werden.**)
		11111	31	Use the Expanded Command list (Refer to **Fehler! Verweisquelle konnte nicht gefunden w erden.**)
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	Commands							
D23…D16	Expanded Commands List					Process parameters [1]					
						Mode-1 Mode-2	Mode-3 Mode-4	Mode-5	Mode-6	Mode-7	Mode-8
		00000000	0	R	Voltage of Power Supply	Voltage of power supply is indicated with 0.1 VDC incr.					
		00000001 00011111	1 31	Not in use							
		00100000	32	R/W		TARE --	TARE --	D_DISC	D_DISC	Not used	VibON
		00100001	33	R/W		TARE__	TARE __	D_GATE	D_GATE	Not unsed	VibOFF
		00100010	34	R/W		D_FILL	D_FILL	ZERO_R	ZERO_R	EXTRA	D_Hold
		00100011	35	R/W		Not used	SAFETY	Not used	L_TRGT	Not used	Gr-Net
		00100100	36	R/W		D_STRT	D_STRT	Not used	Not used	Not unsed	D_End
		00100101	37	R/W		S_TYPE	S_TYPE	Not used	Not used	Not unsed	Not unsed
		00100110	38	R/W		Not used	Not used	GAT_Ch	GAT_Ch	GAT_C	Not unsed
		00100111 00111111	39 63	Not used							
		01000000	64	R/W	Filter [1]	Refer to par. [120], page 33					
		01000001	65	Not used							
		01000010	66	R/W	Zeroing Range [1]	Refer to par. [203], page 34					
		01000011	67	R/W	Auto Zero Tracking [1]	Refer to par. [204], page 34					
		01000100	68	R/W	Tare [1]	Refer to par. [205], page 34					
		01000101	69	R/W	Motion Detector [1]	Refer to par. [206], page 34					
		01000110 01000111	70 71	Not used							
		01001000	72	R/W	Capacity [1]	Refer to par. [212], page 34					
		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	75	Not Used		
		01011111	95			
		01100000	96	R/W	Filling mode selection [1]	Refer to par. [500], page 69
		01100001	97	R/W	Feeding type [1]	Refer to par. [501], page 69
		01100010	98	R/W	Preact correction factor [1]	Refer to par. [502], page 69
		01100011	99	R/W	Preact correction freq. [1]	Refer to par. [503], page 69
		01100100	100	R/W	Check delay [1]	Refer to par. [504], page 70
		01100101	101	R/W	Zeroing period [1]	Refer to par. [505], page 70
		01100110	102	R/W	Zeroing delay [1]	Refer to par. [506], page 70
		01100111	103	R/W	Indcation at end of filling [1]	Refer to par. [507], page 70
		01101000	104	R/W	Feeding check [1]	Refer to par. [508], page 70
		01101001	105	R/W	Filling time [1]	Refer to par. [509], page 70
		01101010	106	R/W	Start Type	Refer to par. [50A], page 70
		01101011	107	R/W	Indication in filling proc [1]	Refer to par. [50B], page 70

Table 18.3 - 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 FILL Px Output to PLC Input 2nd Dword'.
2. If there is not any error, read a weight value (gross, net or tare),

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

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

19. APPROVED SCALE'S SEALING

Label sealing

Load cell connector and
housing sealing

Load cell connector and
housing sealing
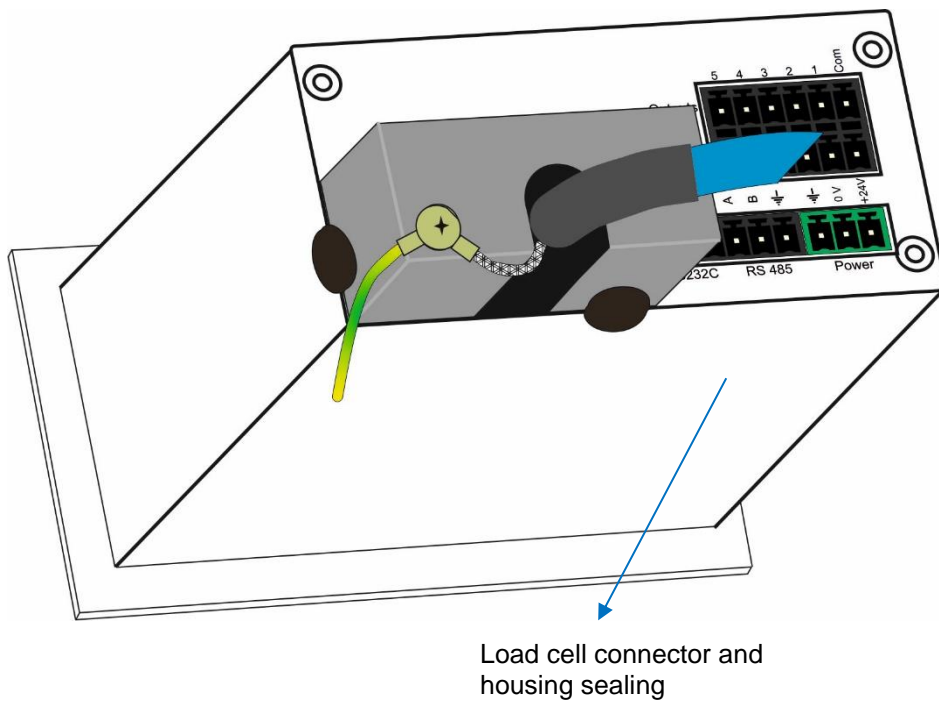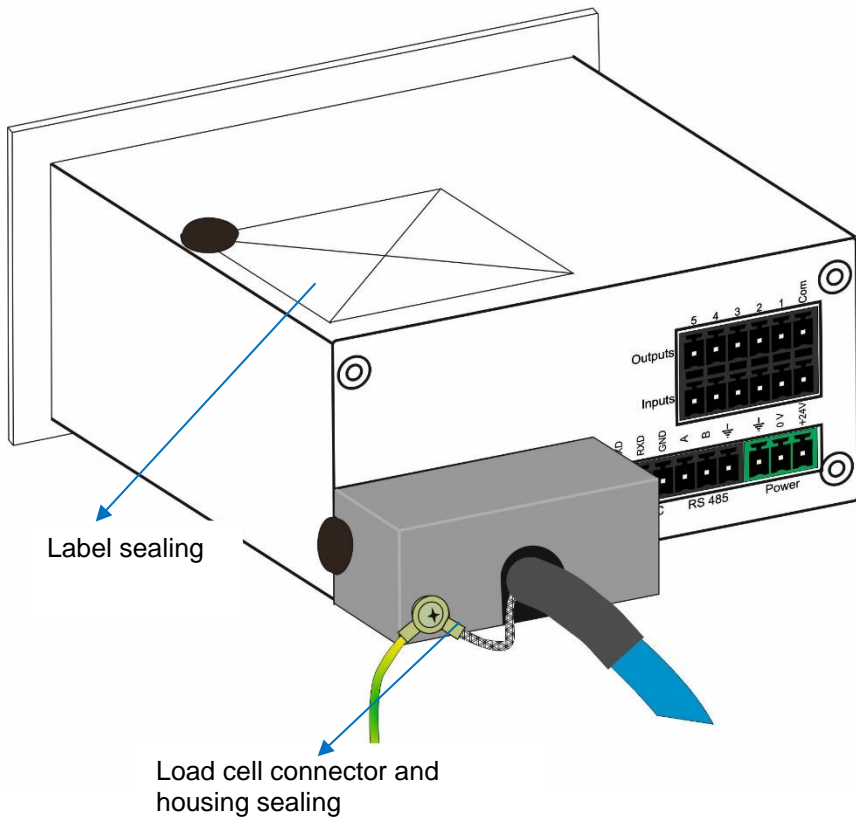
20. TROUBLE SHOOTING

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

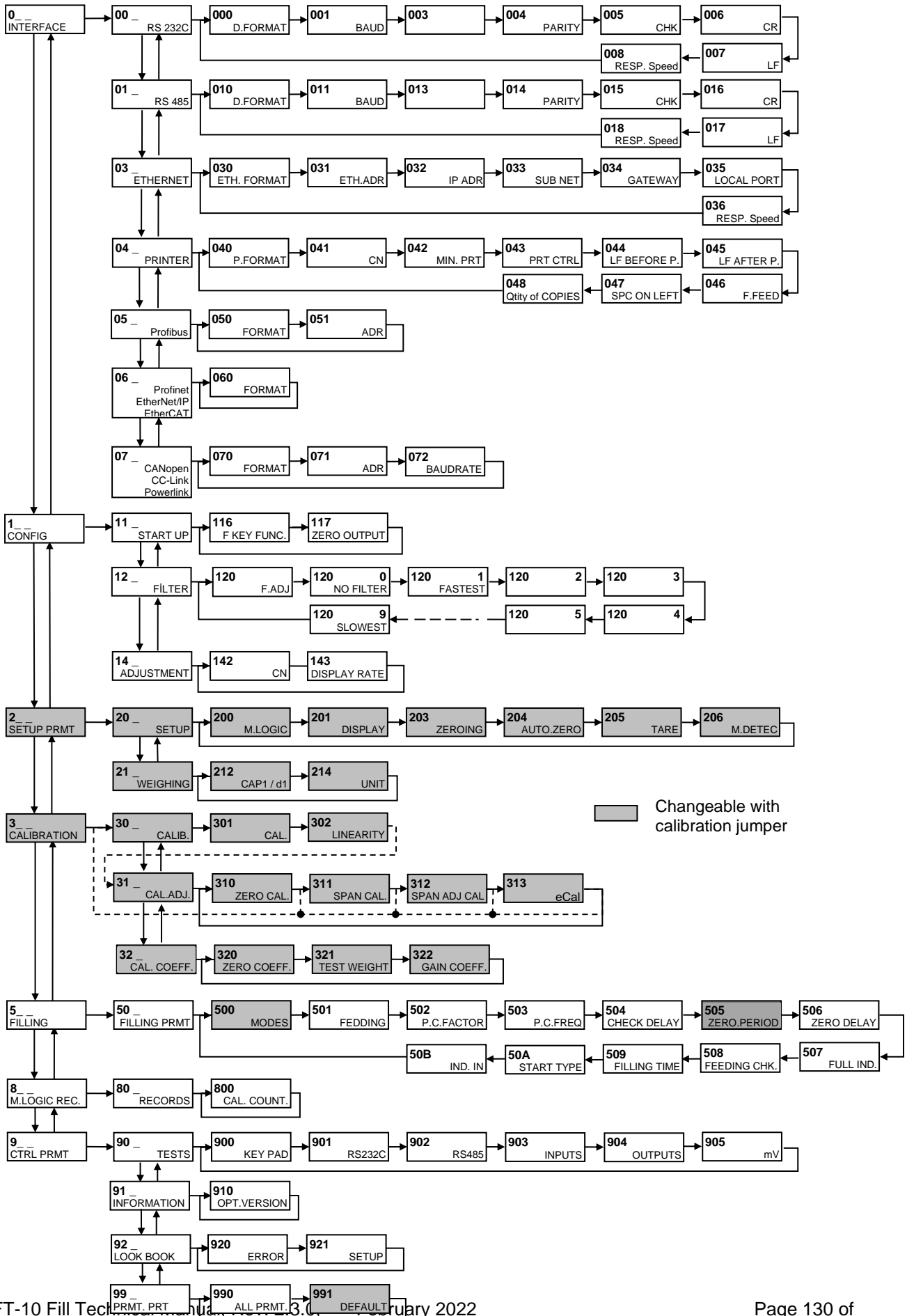| ERROR CODE	DESCRIBTION	THINGS TO DO
Under	Weight is too low	- Check the load - Load cell or instrument could be broken.
Over	Over Load	
ADC Out	Load exceeds the operation range	- Check the load - Check the calibration - Load cell or instrument could be broken.
Err 1	ADC error	- Re-energize indicator - 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 pcb 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

21. PARAMETER DEFAULT TABLE

0--	Interface Block	
00-	RS 232C	
000	Data Format	3 = BSI
001	Baud rate	3 = 9600
003	Address	0
004	Data length and Parity	0 = 8 bit, no parity
005	Checksum	0 = Disable
006	Carriage Return	1 = Enable
007	Line Feed	1 = Enable
008	Response Speed	0 = immediately
01-	RS 485	
010	Data Format	5 = Modbus RTU Lo-Hi [1]
011	Baud rate	3 = 9600
013	Address	1
014	Data length and Parity	0 = 8 bit, no parity
015	Checksum	0 = Disable
016	Carriage Return	1 = Enable
017	Line Feed	1 = Enable
018	Response Speed	0 = immediately
03-	Ethernet	
030	Ethernet Data Format	5 = Modbus RTU Lo-Hi
031	Ethernet Address	1
032	IP Address	192.168.016.250
033	Subnet Mask	255.255.255.000
034	Gateway Address	192.168.016.253
035	Local Port	502
036	Response Speed	0 = immediately
04-	Printer	
040	Print out format	2 = Multi line
041	CN	1 = Will be printed
042	Minimum print	20
043	Print method	0 = With Print Key
044	Line feed before printing	00 = 0 F + 0 LF
045	Line feed after printing	04 = 0 F + 2 LF
046	Form feed	0 = Disable
047	Space on the left	3
048	Quantity of copies	1
05-	Profibus DP	
050	Data Format	0 = signed 32 bit
051	Rack Address	0
06-	Profinet, EtherNET/IP, EtherCAT, Powerlink	
060	Data Format	0 = signed 32 bit
07-	CANopen, CC-Link	
070	Data Format	0 = signed 32 bit
071	Rack Address	0
072	Baudrate	0 = 156 kbps
1--	Configuration Block	
11-	Start Up	
116	Function key	3 = Quantitiy
117	Zero output	0 = Gross zero
12-	Filter	
120	Filter	7

14-	Entries	
142	Label No entrance	
143	Display Refresh Rate	1 = 100ms
2--	Scale Block	
20-	Set up	
200	Approved	0 = No
201	Increased indication	0 = x10 key
203	Zero range	3 = ± %50
204	Auto zero tracking	0 = Disable
205	Tare	2 = Tare/Clear
206	Motion detector	2 = ± 1e
21-	Scale Build	
212	Capacity / d	60 kg / 0.01 kg
214	Unit	0 = kg
3--	Calibration Block	
30-	Calibration	
301	Calibration	
302	Linearity Correction	
31-	Adjustment	
310	Zero adjustment	
311	Span adjustment	
312	Span adjustment under load	
313	eCal Calibration	
5--	Filling Block	
50-	Filling Parameters	
500	Filling mode	1 = Mode-1
501	Feeding type	1
502	Preact correction factor	50%
503	Preact correction frequency	1
504	Check delay	1.0 sec.
505	Zeroing period	250 sec.
506	Zeroing delay	2.0 sec.
507	Indication at the end of filling	0
508	Feeding check	0
509	Filling time	0
50A	Start Type	0
8--	Metrological Data Block	
80-	Legal Metrology	
800	Calibration counter	
9--	Diagnostic	
90-	Tests	
900	Key Pad testing	
901	RS 232C testing	
902	RS 485 testing	
903	Parallel inputs test	
904	Parallel outputs test	
905	mV indication	
99-	Printing Parameters	
990	Whole parameters	
991	Load default parameters	

1)Except for FT-10Fill EN

22. SETUP AND CALIBRATION MENU

0 _ _ INTERFACE

- **00 _ RS 232C** → **000 D.FORMAT** → **001 BAUD** → **003** → **004 PARITY** → **005 CHK** → **006 CR** → **007 LF** → **008 RESP. Speed**
- **01 _ RS 485** → **010 D.FORMAT** → **011 BAUD** → **013** → **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** → **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**
- **05 _ Profibus** → **050 FORMAT** → **051 ADR**
- **06 _ Profinet EtherNet/IP EtherCAT** → **060 FORMAT**
- **07 _ CANopen CC-Link Powerlink** → **070 FORMAT** → **071 ADR** → **072 BAUDRATE**

1 _ _ CONFIG

- **11 _ START UP** → **116 F KEY FUNC.** → **117 ZERO OUTPUT**
- **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** → **142 CN** → **143 DISPLAY RATE**

2 _ _ SETUP PRMT

- **20 _ SETUP** → **200 M.LOGIC** → **201 DISPLAY** → **203 ZEROING** → **204 AUTO.ZERO** → **205 TARE** → **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**
- **32 _ CAL. COEFF.** → **320 ZERO COEFF.** → **321 TEST WEIGHT** → **322 GAIN COEFF.**

5 _ _ FILLING

- **50 _ FILLING PRMT** → **500 MODES** → **501 FEDDING** → **502 P.C.FACTOR** → **503 P.C.FREQ** → **504 CHECK DELAY** → **505 ZERO.PERIOD** → **506 ZERO DELAY** → **507 FULL IND.** → **508 FEEDING CHK.** → **509 FILLING TIME** → **50A START TYPE** → **50B IND. IN**

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**
- **91 _ INFORMATION** → **910 OPT.VERSION**
- **92 _ LOOK BOOK** → **920 ERROR** → **921 SETUP**
- **99 _ PRMT. PRT** → **990 ALL PRMT.** → **991 DEFAULT**

23. 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.

NUMBER OF SCALE INTERVAL (n) — rows are **SCALE INTERVAL (e)**

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

24. SUBJECT INDEX

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