Technical Manual

IT3000Ex

Type: IT3000Ex-230VAC

Type: IT3000Ex-24VDC

Type: IT3000Ex-12VDC

II 2(2)G Ex e ib mb [ib] IIC T4 Gb

II 2(2)D Ex ib tb [ib] IIIC T125°C Db IP65

May 2013

ST.2309.0705

Rev. 10

Technical Manual IT3000Ex

Date:	May 13, 2013	
File:	IT3000EX_THE.DOC	
Program Version:	IT3000Ex	as of 2.19
	IT3000Ex_P	as of 1.00

Published By:

Please Note:

While every precaution has been taken in the preparation of this manual, SysTec GmbH assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained herein.

The publisher is grateful for any information and/or advice that may contribute to correct errors or omissions in following editions.

Contents

1 Introduction

1.1 About This Manual

This manual contains information and Technical Data for the use, the installation and the operation of the IT3000-230VAC, IT3000Ex-24VDC and IT3000Ex-12VDC industrial weighing terminal, called hereafter IT3000Ex.

The weighing terminal must only be operated by trained personnel. For the operation by the enduser who is not envolved in the technical aspects of the installation, the 'Operation Manual IT3000Ex' (ST.2309.0708) is available.

Note: The operating mode 'Online P' is only available when the weighing terminal is ordered together with the software option 'Online P' (IT3000Ex P).

1.2 Safety Symbols Used In This Manual

Safety relevant information is shown with corresponding symbols as follows:

W A R N I N G
Failure to observe this precaution could result in serious injuries or fatal accidents. Please make absolutely sure that these precautions are observed in order to ensure safe operation of the equipment.

Ex

W A R N I N G
Failure to observe this precaution could result in serious injuries or fatal accidents due to ignition of an explosive atmosphere (gas and/or dust). Please make absolutely sure that these precautions are observed in order to ensure safe operation of the equipment.

Note:

- This indicates an advice for the intended use of the equipment and/or additional information to avoid improper handling.

1.3 Safety Advice

Ex

W A R N I N G
Disconnect all power to this instrument before opening the housing! Risk of explosion!
It is not sufficient to press the On/Off button on the keyboard of the terminal.

Ex

W A R N I N G
Make absolutely sure before servicing that no potentially explosive atmosphere can be present at any time!

W A R N I N G
Exercise utmost care when making checks, tests and adjustments that can actuate movable parts such as feeding devices, gates, flaps, conveyors, etc. Make absolutely sure that nobody is within reach of movable parts.

Ex

W A R N I N G
This weighing terminal must not be used in Ex-Zone 0 and Zone 20.
It is the sole responsibility of the employer / operating company to classify the area of installation (zone, group, temperature class). To that effect, the assistance of the Technical Supervisory Service or any other technical authority may be utilized!

W A R N I N G
When this unit is included as a component part of a system, the resulting system design must be reviewed by qualified personnel who are familiar with the construction and operation of all individual components in the system and the potential hazards involved.

W A R N I N G
For installation, service and operation of the unit, the ATEX directive as well as all locally applicable regulations for safety and the prevention of accidents must be observed!

W A R N I N G
Input voltage of the instrument must comply with local mains supply! The input voltage must not exceed at any time the permissible maximum voltage of the weighing terminal Um.

W A R N I N G
This module and its associated equipment must only be installed, adjusted and maintained by qualified personnel authorized by SysTec GmbH!

W A R N I N G
If a permanently connected power supply cable is used, an easily accessible separator must be included in the supply circuit!

W A R N I N G
The weighing terminal may not be installed in areas where very high electrostatic charging is possible which may produce propagating brush discharges at the front panel. Comment: According to common knowledge, the use and cleaning of the equipment do not produce such a high surface charge density.

W A R N I N G
Risk of electrical shock! When operating electrical devices, parts of this devices are connected to dangerously high voltages. Inappropriate use of such devices may lead to serious bodily injuries or substantial damages to property.

Notes:

- Only permit qualified personnel to operate this instrument!
  Disconnect all power to this instrument before cleaning and servicing!
- All switch gear connected to the unit and/or installed close to it, such as relays and contactors, must be fitted with appropriate components (RC-modules, diodes) to suppress interference.
- In order to avoid static discharge, all metallic parts of a system must be thoroughly grounded.
- Keep this manual for future reference!

1.4 Declaration Of Conformity

SysTec Systemtechnik und Industrieautomation GmbH
Ludwig-Erhard-Str. 6
D-50129 Bergheim-Glessen

CE EC Declaration of Conformity

Manufacturer:	**SysTec GmbH**
Type/model:	**IT3000Ex-230VAC** **IT3000Ex-24VDC** **IT3000Ex-12VDC**
No. of the EC type approval certificate (NAWI):	**D05-09-033**
No. of the EC type approval certificate (ATEX):	**TUV 05 ATEX 7230 X**

The device corresponds to:

the production model described in the type approval certificate No. D05-09-033 issued by the PTB Braunschweig as Notified Body and to the requirements of the:

EC Directive **2009/23/EC (non-automatic weighing instruments)**

in conformity with the following standards:

EN 45501:2004 **OIML R51-1:2006** **OIML-R76-1:2006**

(With respect to the EC Directive 2009/23/EC this declaration is only valid with a certificate of conformity of a Notified Body.)

and:

the production model described in the EC type approval certificate No. TUV 05 ATEX 7230 X issued by the TUV Rheinland GmbH as Notified Body and the requirements of:

EC Directive **94/9/EC (ATEX)**

in conformity with the following standards:

IEC60079-0: 2011 **EN60079-7: 2007** **EN60079-11: 2012**
EN60079-18: 2009 **EN60079-31: 2009**

(Notified Body for the supervision of the ATEX requirements: DEKRA EXAM GmbH, No. 0158.)

and:

the requirements of the:

EC Directive **2004/108/EC (Electromagnetic Compatibility)**

in conformity with the following standards:

EN 61000-6-2:2005 **EN 61000-6-4:2001** **EN 55011**

the requirements of the:

EC Directive **2006/95/EC (Low Voltage Directive)**

in conformity with the following standards:

EN 60950-1:2001 + A11:2004

Date: August 13, 2012

Dipl.-Ing. Rainer Junglas
General Manager

2 Marking

Manufacturer	Systec Systemtechnik und Industrieautomation GmbH
	Ludwig-Erhard-Straße 6
	50129 Bergheim-Glessen
Designation	IT3000Ex-230VAC
	IT3000Ex-24VDC
	IT3000Ex-12VD
Type of housing	Wall-mount / desk-top
	Panel-mount
Year of maufacturing:	jjjj
S/N:	Ex yy xxxx
Ex classification	 II 2(2)G Ex e ib mb [ib] IIC T4 Gb
	II 2(2)D Ex ib tb [ib] IIIC T125°C Db IP65
CE marking	CE 0158
Type approval certificate	TÜV 05 ATEX 7230 X
Service	Only through service partners authorized by SysTec GmbH
	enquire for addresses

3 System Description

3.1 General Description

IT3000Ex is a universal weighing terminal for use in a variety of applications such as data logging, data capturing and set point control, suitable for installation in Ex zones 1, 2, 21 and 22.

It features 2 intrinsically safe digital inputs/outputs.

A piggyback module (ADM-Exi) can be installed installiert to connect a scale base with analog strain gauge loadcells with an overall impedance between 87.5 Ω and 4500 Ω.

Also, a piggyback module (SIM-10mA-Exi) can be installed to privide an intrinsically safe serial interface.

The weighing terminal is available in six versions for different supply voltages (230VAC, 24VDC or 12VDC battery operated) and housing options (desk-top / wall-mounting or panel-mounting).

Cables of all external components are connected at screw terminals. Weight and additional information is indicated on a back-lit 20-character LCD, height of characters 14mm. Operation and data entry is made via a sealed membrane keyboard with numeric peypad and function keys.

Operation, sequence and printout can be configured for a specific application. All entries required for the configuration can be made through the keyboard of the terminal. As an alternative, a comprehensive PC program for configuration and archiving is available. Instead of operating the terminal locally via keyboard and display, full remote control is possible over the serial interface.

IT3000Ex is available in six basic configurations:

Type	Housing	Article-No.	Description
IT3000Ex-230VAC	Wall / desk	E3SYS001	Basic unit for desk-top / wall-mounting with 2.5m cable with free ends to connect to 110 - 230 VAC
		E3SYS401	Basic unit for desk-top / wall-mounting with 15m cable with free ends to connect to 110 - 230 VAC
	Panel-mount	E3SYS011	Basic unit for panel-mounting with 2.5m cable with free ends to connect to 110 - 230 VAC
		E3SYS411	Basic unit for panel-mounting with 15m cable with free ends to connect to 110 - 230 VAC
IT3000Ex-24VDC	Wall / desk	E3SYS005	Basic unit for desk-top / wall-mounting with 2.5m cable with free ends to connect to 24VDC
	Panel-mount	E3SYS015	Basic unit for panel-mounting with 2.5m cable with free ends to connect to 24VDC
IT3000Ex-12VDC	Wall / desk	E3SYS006	Basic unit for desk-top / wall-mounting with 2m cable with Ex-de plug type miniCLIX to connect to AkkuBox E3AKK001
	Panel-mount	E3SYS016	Basic unit for panel-mounting with 2m cable with Ex-de plug type miniCLIX to connect to AkkuBox E3AKK001
	Wall / desk	E3SYS007	Basic unit for desk-top / wall-mounting with 2m cable with Ex-de plug type DXN1 to connect to AkkuBox E3AKK002
	Panel-mount	E3SYS017	Basic unit for panel-mounting with 2m cable with Ex-de plug type DXN1 to connect to E3AKK002

3.2 Definition Of Safety-Relevant Electrical Values

Power supply	Type	Type of protection	
	IT3000Ex-230VAC	Ex e/m	Maximum short-circuit current at place of installation must be smaller than 1500A.
			Un: 110-230VAC –15%/+10% / 47 - 63 Hz
			Pn: 4.5 W max.
			Um: 253V
	IT3000Ex-24VDC	Ex e	Maximum short-circuit current at place of installation must be smaller than 1500A.
			Un: 24 VDC +10% / –15%
			Pn: 4 W
			Um: 253V
	IT3000Ex-12VDC	Ex e	Un: 10.8 -14.2VDC
			Pn: 3.5W max.
			Um: 14.2VDC
2 digital inputs, in total (one common intrinsically safe circuit)		Ex i	Uo: 6.51V
			Io: 13.2mA; in total
			Po: 21.4mW; in total
			Co: 3.4μF; in total
			Lo: 200μH; in total
2 digital outputs, in total (one common intrinsically safe circuit)		Ex i	Uo: 6.51V
			Io: 137.1mA; in total
			Po: 223.1mW; in total
			Co: 3.1μF; in total
			Lo: 200μH; in total
Serial interface (SIM-10mA)		Ex i	Uo: 6.51V
			Io: 39.8mA
			Po: 64.8mW
			Co: 1.9μF
			Lo: 2mH
Scale connection (ADM-Exi)		Ex i	Uo: 6.51V
			Io: 285mA
			Po: 950mW
			Co: 98.3nF
			Lo:130.5μH

3.3 Housing

IT3000Ex is available in a desk-top / wall-mount housing (E3SYS00x-xxx-x) or in a panel-mount housing (E3SYS01x-xxx-x). The stainless steel housing is protected to IP65 and has 5 cable glands for the connection of external components.

See section 'Dimensions' for details.

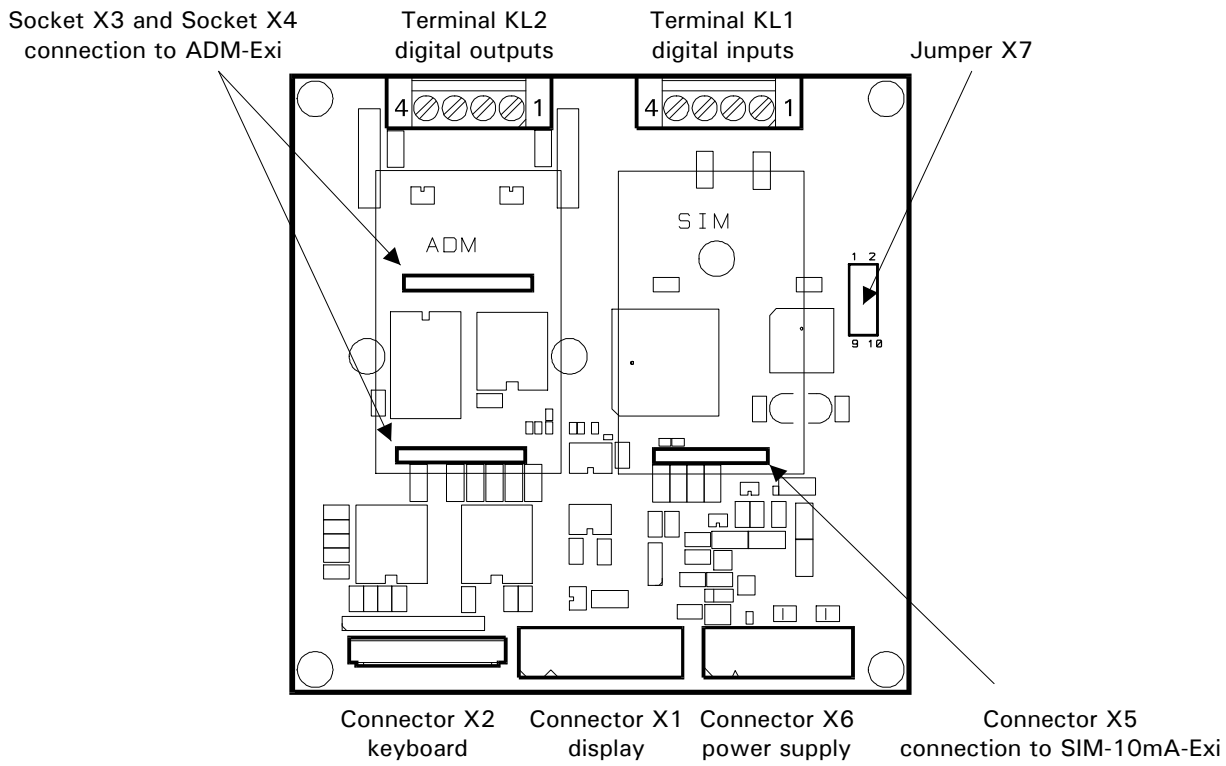
Ex **The housing must be included in the equipotential bonding of the installation with the bonding conductor connected at the M5 stud at the outside of the housing.**

3.4 Description Of Components

3.4.1 Main Module CPU3000Exi

The CPU3000Exi is the core of the weighing terminal. It contains the microcontroller with data and program memory, two digital I/Os and two sockets for the scale interface board (ADM-Exi) and a serial interface module (SIM-10mA-Exi). Also included are connectors for keyboard, display and power supply.

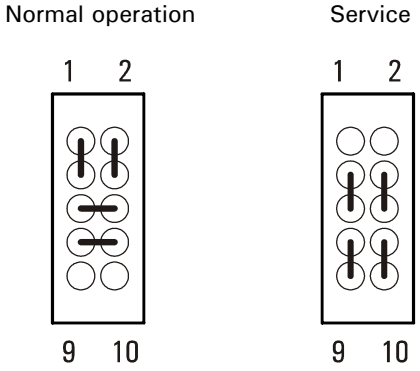
Layout of components on CPU3000Exi main module



3.4.2 Configuration Jumper (CPU3000Exi)

With the jumpers X7 the operating mode of the CPU3000Exi is configured.

The CPU3000Exi is factory-set to normal operation, IT3000Ex must always be operated in this mode. IT3000Ex does not start when the jumpers are set to the 'Service' position.



3.4.3 Display

To indicate the weight, status information and operator prompts a back-lit 20-character LCD display is used. The height of characters is 14mm, each character is formed by a matrix of 5x7 dots. The display is connected at the 16-pin connector X1 on the main module.

By means of the selectable powersave function, backlighting can be switched off after time when the the terminal is not in use.

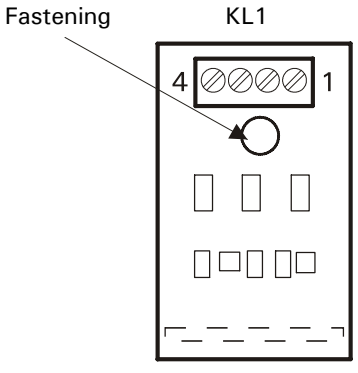
3.4.4 Keyboard

The alphanumeric keyboard permits the input of numbers, letters and special characters. The keyboard also features keys for scale functions, 8 function keys and an On/Off key.

3.4.5 Interface Module SIM-10mA-Exi

The **S**erial **I**nterface **M**odule **SIM-10mA-Exi** provides an intrinsically safe serial 10mA interface. The module can be plugged into a socket on the **CPU3000Exi**. In combination with the SysTec interface coupler, communication is possible between hazardous and non-hazardous area.

Layout of interface module SIM-10mA-Exi



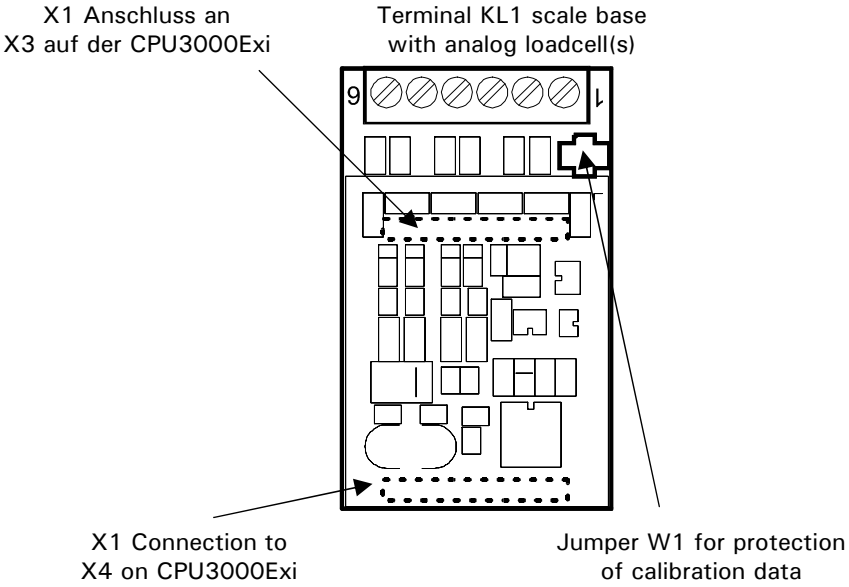
X1 Connection to X5
on CPU3000Exi

3.4.6 Scale Interface Module ADM-Exi

The **A**nalog **D**igital **M**odul ADM-Exi permits the connection of one analog scale base with intrinsically safe loadcells in 6- or 4-conductor mode. The ADM-Exi board plugs into the socket (X1 / X2) on the main module CPU3000Exi. Calibration data are stored in EEPROM and secured with the jumper W1.

The ADM-Exi module is not required for the remote display version.

Terminal assignment on ADM-Exi module

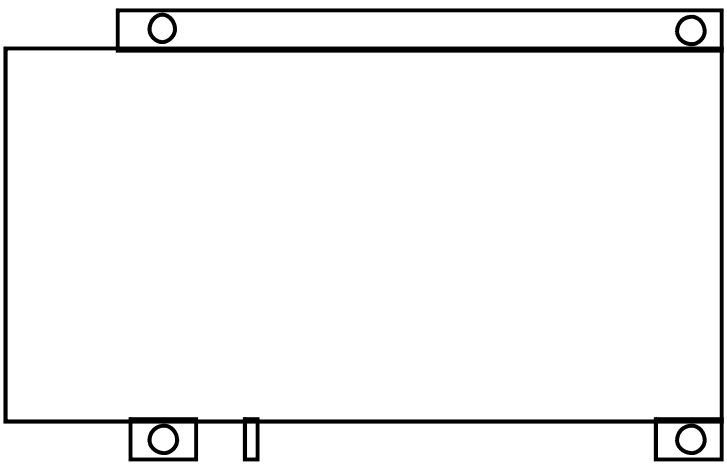


Connection of weighing platforms and loadcells is made as specified below:

- Overall impedance of the connected intrinsically safe loadcells from 87.5 Ω to 4500 Ω
- W&M approved resolution of 6000d at a max. preload of 80%, internal resolution 524,000d
- Smallest permissible input signal for approved applications: 0.33 μV / e
- Update rate 50 updates / second
- Loadcell excitation: 5 V ±5% (gated power supply).

3.4.7 Power Supply Unit PS-Ex-230 (for IT3000Ex-230VAC)

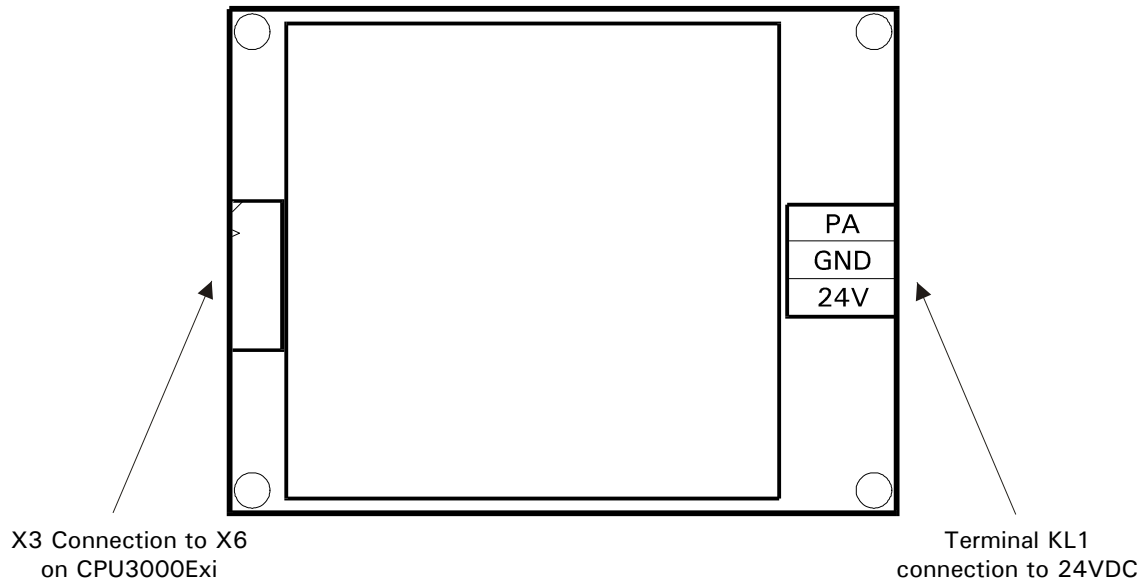
The power supply unit PS-Ex-230 is protected to Ex-mb with potted cable ends and Ex-i output connector. The input voltage ranges from 110 - 230VAC –15% /+10% / 47 - 63 Hz. The intrinsically output voltages supply the components of the weighing terminal.



3.4.8 Power Supply Unit PS-Ex-24

The power supply unit PS-Ex-24 is protected to Ex-mb with Ex-e input terminals and Ex-i output connector. The input voltage is 24VDC (+10% / –15%). The intrinsically safe output voltages supply the components of the weighing terminal.

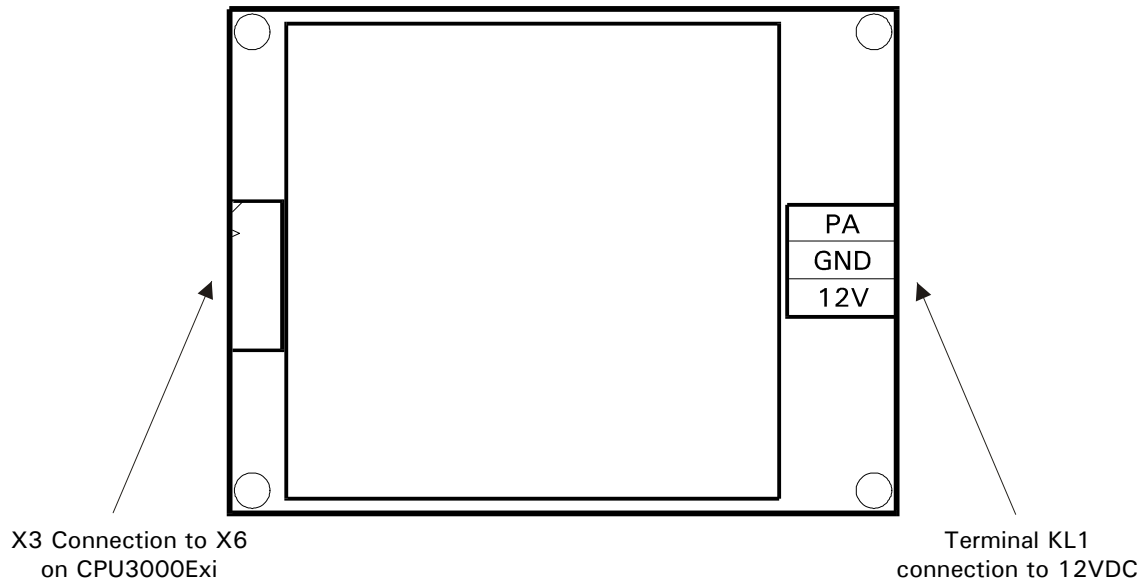
Terminal assignment for input and output voltages



3.4.9 Power Supply Unit PS-Ex-Akku (for IT3000Ex-12VDC)

The power supply unit PS-Ex-Akku is protected to Ex-mb with Ex-e input terminals and Ex-i output connector. A prefabricated cable with Ex-de plug for the battery box is connected to the input terminals. The input voltage is 10.8 - 14.2VDC. The intrinsically safe output voltages supply the components of the weighing terminal.

Terminals for input and output voltages



4 Intended Use

Ex

In compliance with RL 94/9/EG (ATEX 95) appendix I, the weighing terminal IT3000Ex is an apparatus of group II category 2G, that following RL 99/92/EG (ATEX 137), can be used in zones 1 and 2, as well as in gas groups IIA, IIB and IIC, which are at risk of explosion through combustible substances of temperature classes T1 to T4.

IT3000Ex is also an apparatus of group II category 2D, that following RL 99/92/EG (ATEX 137) can be used in zones 21 and 22 (dust), the maximum surface temperature is 125 °C.

The weighing terminal may not be installed in areas where very high electrostatic charging is possible which may produce propagating brush discharges at the front panel. Comment: According to common knowledge, the use and cleaning of the equipment do not produce such a high surface charge density.

Applicable only to IT3000Ex-24VDC: The type of protection of the connection of the supply voltage is 'increased safety Ex-e'. The supply voltage is 24 VDC. This voltage must be supplied by one of the external 230 VAC power supply units listed below:

1) Power supply unit 230VAC/24VDC for use in Ex zone 1, 2, 21 and 22
   Article-No. E3OPT903-EU
2) Power supply unit 230VAC/24VDC for use in non-hazardous area
   Article-No. E3OPT901 or E3OPT902-EU
3) Equivalent power supply unit 230VAC/24VDC as per following specification:

- SELV in compliance with EN60950
- Output current limited to 10A max.
- Um = 253V, max DC/AC voltage as per EN60079-11:2007 section 3.16.
- Power supply unit incorporated in metal housing (observe instructions on equipotential bonding, see chapter 'Equipotential Bonding').
- If this power supply unit is installed in hazardous area, it must comply with the required Ex type of protection.
- Connecting cables from the power supply unit to the weighing terminal must be shielded. The shield must be connected on both sides. Only use suitable cable in compliance with EN60079-14:2008 section 9.

Observe the Technical Manual of the installed power supply unit.

Applicable only to IT3000Ex-12VDC: The connection of the power supply is protected to increased safety Ex-e, the supply voltage is 12VDC. This voltage must be supplied from one of the following external rechargeable batteries:

1) AkkuBox Ex; 12VDC, with miniCLIX socket, for use in Ex zone 1 and 2, 21 and 22, article-No. E3AKK001;
2) AkkuBox Ex; 12VDC, with DXN1 socket, for use in Ex zone 1 and 2, 21 and 22 article-No. E3AKK002;
3) Equivalent 12V rechargeable battery as per following specification:

- Um = 14.2VDC, max. DC voltage in compliance with EN60079-11:2007 section 3.16;
- Battery incorporated in metal housing Akku eingebaut in Metallgehäuse (observe instructions on equipotential bonding, see chapter 'Equipotential Bonding');
- If the rechargeable battery is installed in hazardous area, it must comply with the required Ex type of protection.
- Connecting cables from the rechargeable battery to the weighing terminal must be shielded. The shield must be connected on both sides. Only use suitable cable in compliance with EN60079-14:2008 section 9.

Observe the Technical Manual of the external rechargeable battery and the Operating Instructions 'Ex connector mini Clix series 8591' or the Operating Instructions DXN.

The ADM-Exi connects to intrinsically safe strain gauge loadcells. The overall impedance of the connected loadcells must be between 87.5 Ω and 4500 Ω. Documented evidence of intrinsic safety as per EN 60079-14 is required.

Ex	The SIM-10mA-Exi connects to an intrinsically safe serial interface. For the communication to the non-hazardous area the equipment listed below is available: 1) Interface coupling module TS3000 for installation in non-hazardous (safe) area Article-No. E3OPT600 -xxx or E3OPT605-xxx 2) ExtensionBox for installation in non-hazardous (safe) area Article-No. E3SYS140-xxx or E3SYS145-x Documented evidence of intrinsic safety as per EN 60079-14 is required.
	Only potential free push buttons or switches may be connected to the intrinsically safe digital inputs. Documented evidence of intrinsic safety as per EN 60079-14 is required.
	Only intrinsically safe piezo-elctric valves may be connected to the intrinsically safe digital outputs. Documented evidence of intrinsic safety as per EN 60079-14 is required.

Ex	The metal housing of the IT3000Ex terminal must be connected at the M5 stud at the outside of the housing to the equipotential bonding system of the installation.
	The permissible ambient temperature range is –10°C to +40°C. When IT3000Ex is installed in a switch cabinet (panel-mount version) this temperature range must also be adhered to inside the switch cabinet.
	For operation/installation the regulation EN 60079-14 must be observed.
	Any other but the intended use of the equipment, modifications and extensions must not be made without the explicit approval of the manufacturer and is deemed not to be intended. Part of the intended use is observance of this Technical Manual and the adherence to inspection and maintenance instructions and intervals. The manufacturer does not assume any liability whatsoever for damages resulting from non-Intended use. Any risk resulting from non-intended use is solely borne by the user.
	The weighing terminal and the interface coupling module TS3000 or the ExtensionBox must be installed within a common equipotential bonding system.
	Protective splash/dust covers or other parts covering the housing are not permitted.
	The housing must be protected against permanent UV radiation.

5 Assembly

Ex	**During assembly of the terminal it must be made absolutely sure that no potentially explosive atmosphere (gas or dust) is present at any time!** **The weighing terminal may not be installed in areas where very high electrostatic charging is possible which may produce propagating brush discharges at the front panel. Comment: According to common knowledge, the use and cleaning of the equipment do not produce such a high surface charge density.**

During assembly of the terminal the generally acknowledged rules of technology must be observed. In particular, for all electrical installation the specific safety regulations must be observed.

The weighing terminal can be installed in in Ex zone 1, 2, 21 or 21. It must be undamaged and the place of installation must be clean.

The desk-top / wall-mount version features mounting brackets. The housing must be firmly installed by means of suitable mounting accessories that are not part of the delivery. All screws must be tightened securely.

The IT3000Ex panel-mount version features screw clamps to fix the unit in the cutout of the switch cabinet.

In compliance with EN 60079-14 the unit must be integrated into the equipotential bonding system of the installation. To connect the bonding conductor, an M5 stud is provided at the rear of the housing.

6 Installation

6.1 General

Ex	This apparatus may only be installed by qualified personnel who are familiar with all regulations applicable to the different types of protection and the methods of installation, as well as the general principles for the classification of zones. This level of competence must correspond to the work that is to be carried out and appropriate training should be provided on a regular basis.
	When the weighing terminal is to be installed in Ex zone 1, 2, 21 or 22 the regulations as per EN 60079-14 must be adhered to.
	The weighing terminal may not be installed in areas where very high electrostatic charging is possible which may produce propagating brush discharges at the front panel. Comment: According to common knowledge, the use and cleaning of the equipment do not produce such a high surface charge density.
	It must be made sure during installation of the weighing terminal that no potentially explosive atmosphere (gas or dust) can be present at any time.
	Installation must be carried out in compliance with applicable DIN/VDE regulations. Also, all country-specific regulations must be observed. Connection of supply volatage must be made in compliance with VDE 0100 and VDE 0160.
	An easily accessible separator must be included in the supply circuit!
	Disconnect all power to the apparatus before carrying out any installation work. Make sure that power cannot be switched on again.

Ex	All cables are led into the housing through Ex cable glands. Strip cable jacket only as long as required for the wires to reach the screw terminals. Use wire end ferrules on stranded cable and avoid protruding wires. When assembling the cable glands make sure that shield of cable is connected inside the cable gland (see also section 7.6).
	When installation is completed close lid and tighten securely with all M4 hexagonal screws provided.
	Applicable only to IT3000Ex-230VAC and IT3000Ex-24VDC: Mains supply to the device must be equipped with a circuit breaker 10 A char. C, breaking capacity 1500A min.

6.2 Equipotential Bonding

Ex	**In compliance with EN 60079-14 the apparatus must be integrated into the equipotential bonding system of the installation. The bonding conductor must have a cross section of min. 4mm². To connect the bonding conductor, an M5 stud is provided at the rear of the housing or at the bottom, respectively.**

6.3 Shielding

Ex	**Use only shielded connection cables. The shield must be connected at both sides in the cable glands. It is mandatory to additionally install equipotential bonding as per EN60079-14 paragraph 12.2.2.3 exception b). The bonding conductor must have a cross section of min. 4mm².**

6.4 Connection Of Supply Voltage To IT30000Ex-230VAC

The 110 - 230VAC supply voltage for the weighing terminal is connected at the free cable end of the power supply module PS-Ex-230.

Range of operating voltage	Un: 110 - 230VAC; –15% /+10%
Frequency range	47 - 63 Hz
Max. voltage for safety	Um: 253V
Type of protection	Ex-e

Color code of cable ends	
brown	L
blue	N
green / yellow	PE

Ex	Connection of voltage supply is designed for type of protection Ex-e. To connect the line cord a suitable method must be chosen in compliance with EN60079-0 (e.g. Ex-e, Ex-d).
	Make sure that the PA connection from the housing of the power supply to rear plate is firmly connected and undamage.
	Mains supply to the device must be equipped with a circuit breaker 10 A char. C, breaking capacity 1500A min.

6.5 Connection Of Supply Voltage To IT3000Ex-24VDC

Connection of voltage supply of the weighing terminal IT3000Ex-24VDC is designed for type of protection Ex-e. The 24VDC supply voltage is connected at terminal KL1 of the internal power supply module PS-Ex-24:

Nominal voltage:	Un: 24 VDC +10% / –15%
Max. voltage for safety:	Um: 253V
Type of protection:	Ex-e
Cross section (rigid wire):	1.0 – 2.5 mm^2
Cross section (stranded wire with wire end ferrule):	1.0 – 1.5 mm^2
Length of stripped insulation:	9 mm
Torque:	0.4 – 0.5 Nm

The 24VDC supply voltage is connected at the Ex-e terminal of the internal power supply unit.

Terminal assignment KL1	
PA	Potential equalization
GND	Supply voltage (—)
24V	Supply voltage (+)

Ex	
	For the connection of the 24VDC supply voltage observe the sequence as detailed below:
	1) Unscrew cover of Ex-e terminals
	2) Connect wires from supply voltage at Ex-e terminals.
	3) Check internal PA connection from PA terminal to PA stud.
	4) Fasten cover over Ex-e terminals.
	For the connection of the terminal to 230V mains supply, the following external power supply units are available. 1) Power supply unit 230VAC/24VDC for use in Ex zone 1, 2, 21 and 22 Article-No. E3OPT903-EU 2) Power supply unit 230VAC/24VDC for use in safe area Article-No. E3OPT901 and E3OPT902-EU 3) Equivalent power supply unit 230VAC/24VDC (see specification under 'Intended Use'. For use of these power supply units refer to the respective Technical Manuals.

Note: The standard scope of supply of the weighing terminal includes a firmly connected cable with free ends and a length of 3m (10KAB316).

Color code of cable ends	
brown	24V
blue	GND

Ex	
	Connection of voltage supply is designed for type of protection Ex-e. To connect the cable a suitable method must be chosen in compliance with EN60079-0 (e.g. Ex-e, Ex-d).
	Mains supply to the device must be equipped with a circuit breaker 10 A char. C, breaking capacity 1500A min.

6.5.1 Connection To Power Supply Unit 230VAC/24VDC (PSU In Safe Area)

If the weighing terminal IT3000Ex-24VDC is to be supplied with 24VDC from safe area, one of the following power supply units can be used:

1) Art.-No. E3OPT901: Power supply unit 230VAC/24VDC for assembly on DIN rail

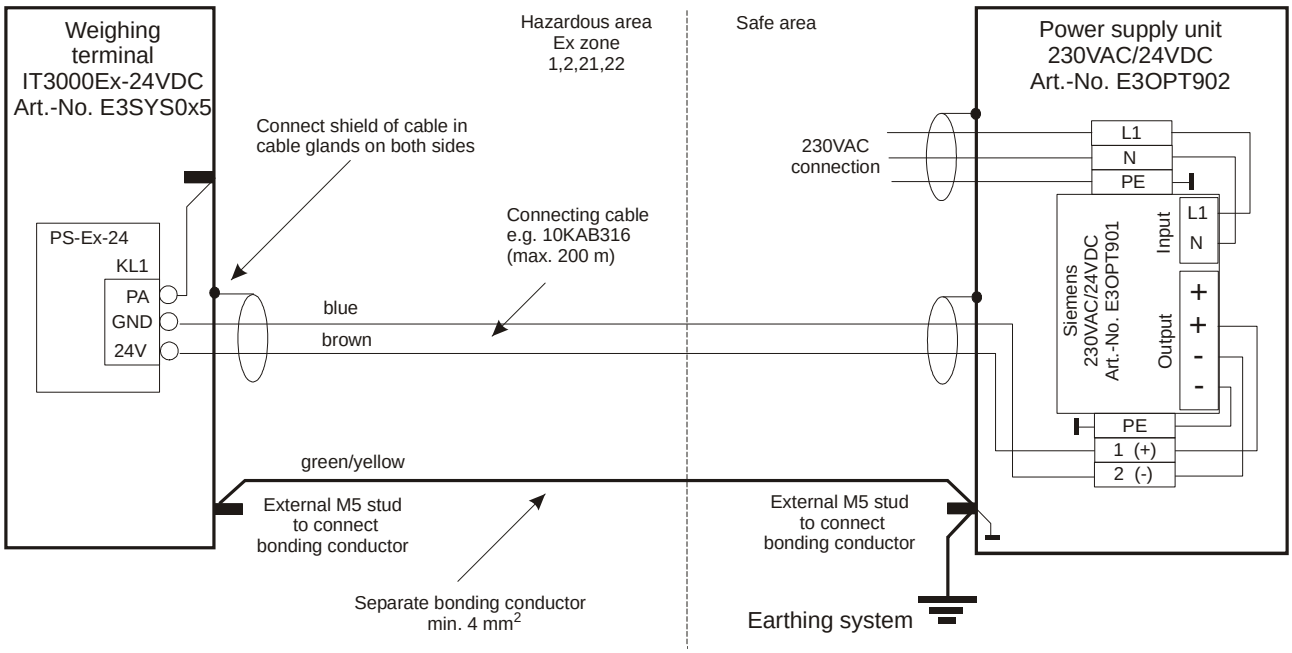
This power supply unit (Siemens make) is to be installed on a DIN rail and must be incorporated in a metal housing (provided by others) protected to IP54 or better. It features screw terminals for the input voltage (230VAC) and the output voltage (24VDC). The metal housing (by others) and the minus connection of the output voltage must be grounded. The Technical Manual of the power supply unit must be observed.

2) Art.-No. E3OPT902: Power supply unit 230VAC/24VDC incorporated in stainless steel housing

This is a power supply unit (Siemens make) incorporated in a stainless steel housing and prewired. It has a line cord of 2.5m length with grounded safety plug for the connection of the input voltage (230VAC) and screw terminals for the connection of the output voltage (24VDC). The power supply unit must be installed in safe area. The Technical Manual of the power supply unit must be observed.

For the connection of the power supply unit (E3OPT901 or E3OPT902) to the weighing terminal IT3000Ex-24VDC only suitable shielded connecting cable, e.g. type SysTec art.-No. 10KAB316 may be used. The shield must be connected at both sides. The max. permissible length of cable is 200 m.

Ex	Power supply unit and weighing terminal must be installed in compliance with EN 60079-14 and must be integrated into the equipotential bonding of the installation.



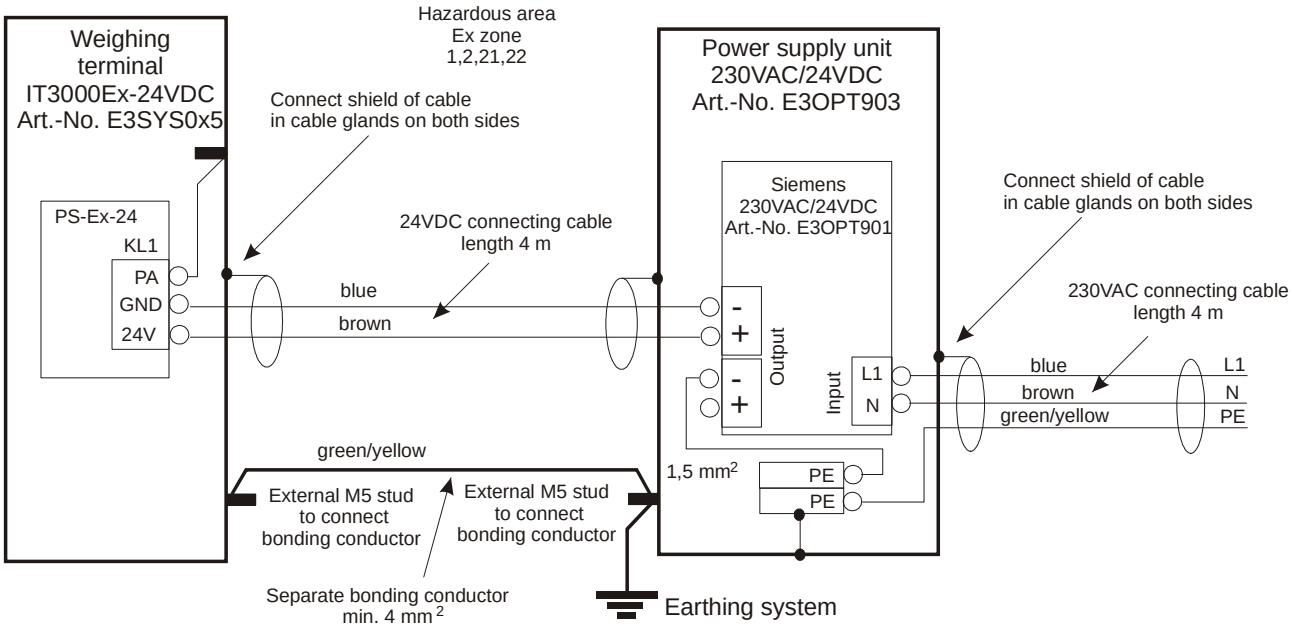
6.5.2 Connection To Power Supply Unit 230VAC/24VDC (PSU In Hazardous Area)

If the weighing terminal IT3000Ex-24VDC is to be supplied with 24VDC in the hazardous area, the following power supply unit must be used:

Art.-No. E3OPT903: Power supply unit 230VAC/24VDC for installation in hazardous area

This is a prewired power supply unit (Siemens make) incorporated in a metal Ex-d housing. The unit has a line cord of 4m length with free ends for the connection of the input voltage (230VAC) and a connecting cable of 4m lenght with free ends for the output voltage (24VDC). The power supply unit may be installed in Ex zones 1, 2, 21 or 22. The input voltage must be connected at a junction box (by others) with Ex-e terminals and appropriate Ex protection. The 24VDC output voltage can be connected directly at the Ex-e terminals of the weighing terminal. The Technical Manual of the power supply unit must be observed.

Ex	Power supply unit and weighing terminal must be installed in compliance with EN 60079-14 and must be integrated into the equipotential bonding of the installation.



6.6 Connection Of Supply Voltage To IT3000Ex-12VDC

Connection of voltage supply to the weighing terminal IT3000Ex-12VDC is designed for type of protection 'Ex-de'. The external rechargeable battery is connected with the 'Ex-de' connector of the cable.

The following types of rechargeable batteries may be used for the supply of the weighing terminal:

1) AkkuBox Ex; 12VDC, with miniCLIX socket, for use in Ex zone 1 and 2, 21 and 22, article-No. E3AKK001;
2) AkkuBox Ex; 12VDC, with DXN1 socket, for use in Ex zone 1 and 2, 21 and 22, article-No. E3AKK002;
3) Equivalent 12V rechargeable battery (see specification in chapter 'Intended Use'.

The Operating Instructions of the rechargeable battery must be obsewrved.

Ex	**The max. voltage for safety of the weighing terminal in compliance with EN60079-11:2012 is Um = 14,2 VDC. This must be ensured by the external rechargeable battery.**

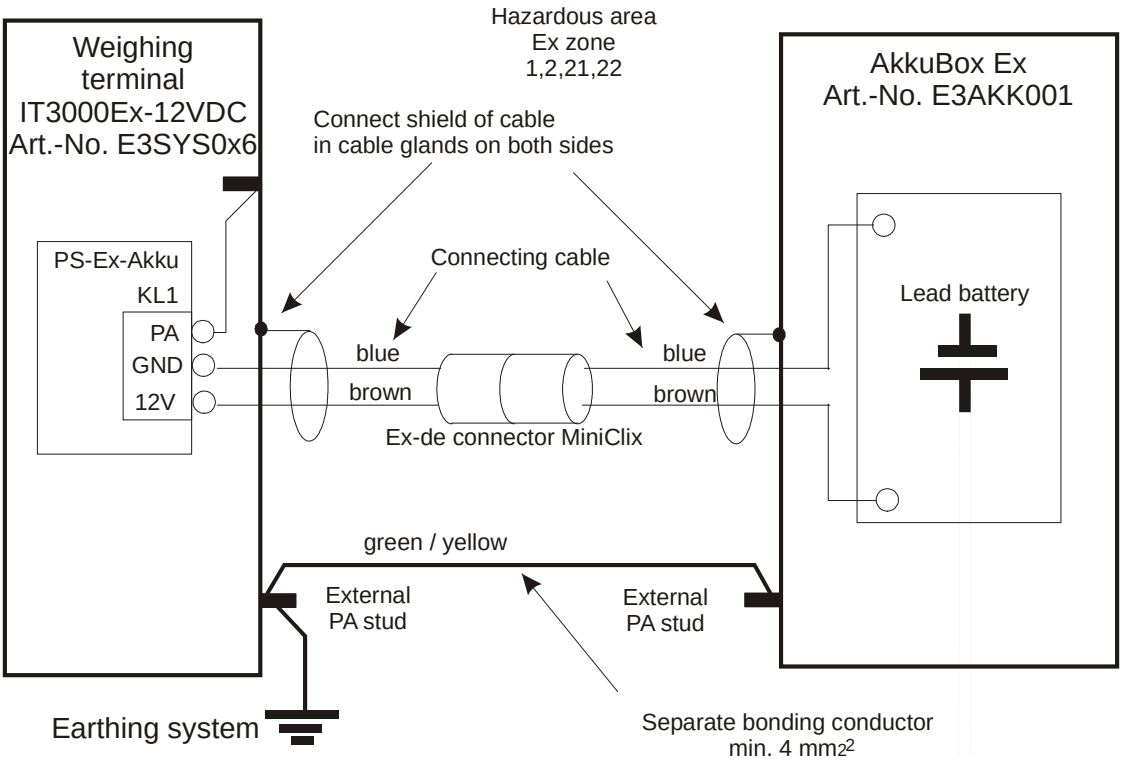
6.6.1 Connection To External AkkuBox Ex With miniCLIX Socket E3AKK001 (AkkuBox Ex In Hazardous Area)

For the supply of the IT3000Ex-12VDC weighing terminal in hazardous area, the following 12V rechargeable SysTec battery is available:

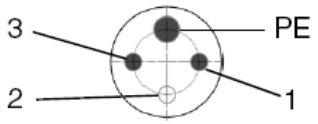
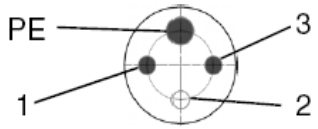
Art.-No. E3AKK001: AkkuBox Ex rechargeable battery with miniCLIX socket for use in hazardous area

This is a rechargeable lead battery, incorporated in a metallic Ex-e housing. It is prewired with a short connecting cable and Ex-de connector (Stahl make, miniCLIX series). The AkkuBox can be used in Ex zone 1, 2, 21 or 22. The Technical Manual of the AkkuBox Ex and the operating instructions 'Ex connectors miniClix series 8591' must be observed.

Ex	AkkuBox and weighing terminal must be installed in compliance with EN 60079-14 and must be integrated in the equipotential bonding system of the installation.



6.6.2 Coding And Pin Assignment Ex Connectors

No. of cores	Coding	Socket e.g. AkkuBox Ex	Connector IT3000Ex-12VDC
2 + PE	12 h		

Assignment

Pin	Voltage
1	12VDC
2	not used
3	GND
PE	Shield of cable

6.6.3 Instructions For Connecting And Separating Coupler

- Before plugging in check connectors for any damages.

- Align male/female connectors along groove (1).
- Push components together up to stop position (2).

- Twist right approx. 30° up to stop (3).
- Push connectors together completely (4).
- Fasten coupling ring tightly (5). This procedure provides for mechanical connection, electrical contact and IP protection.
- Disconnect in reverse order.

⚠ Ex	Absolutely adhere to operating instructions 'Ex-connector miniClix series 8591'.
	Components must have identical coding to avoid damages to connector/socket.
	The supply cable to the plug-and-socket connection must be firmly installed and sufficienty protected against mechanical damage. Cables must comply with the thermic and mechanical requirements at the site of installation.
	When connectors are not connected correctly, protection against risk of explosion is no longer warranted. Strictly follow the instructions!
	After separating, immediately cover components of the plug-and-socket connection conducting voltage with protective cap!
	For the supply of the weighing terminal the following rechargeable batteries can be used: 1. AkkuBox Ex; 12VDC for use in Ex-zone 1 and 2, 21 and 22; article.-No. E3AKK001 2. Equivalent 12V rechargeable battery (see specification in chapter 'Intended Use'). Observe the operating instructions for the rechargeable battery.

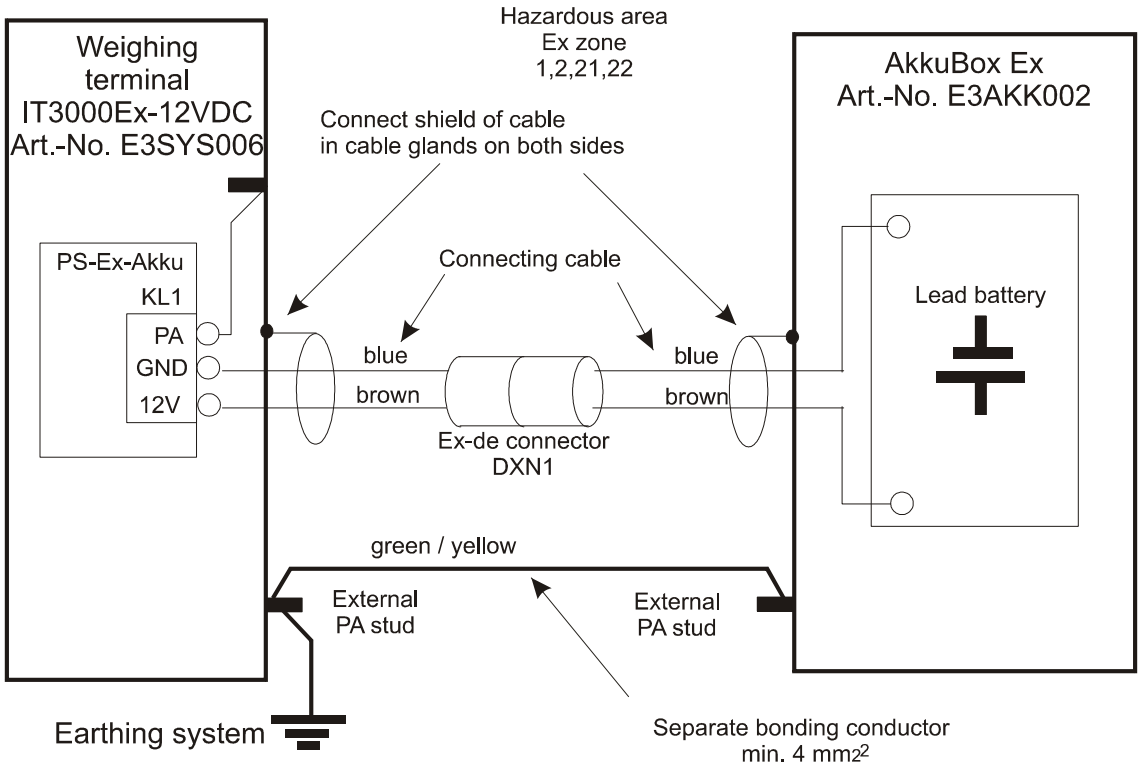
6.6.4 Connection To External AkkuBox Ex With DXN1 Socket E3AKK002 (AkkuBox Ex In Hazardous Area)

For the supply of the IT3000Ex-12VDC weighing terminal in hazardous area, the following 12V rechargeable SysTec battery is available:

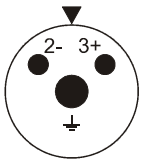
Art.-No. E3AKK002: AkkuBox Ex rechargeable battery with DNX1 socket for use in hazardous area

This is a rechargeable lead battery, incorporated in a metallic Ex-e housing. It is prewired with a short connecting cable and Ex-de connector (Marechal make, type DNX1). The AkkuBox can be used in Ex-zone 1, 2, 21 or 22. The Technical Manual of the AkkuBox Ex and the operating instructions 'Ex connector DNX1' must be observed.

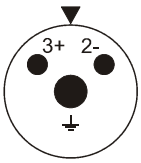
Ex AkkuBox and weighing terminal must be installed in compliance with EN 60079-14 and must be integrated in the equipotential bonding system of the installation.



Pin assignment DXN1 connector:



Top view socket



Top view plug

DXN1 Pin	Assignment
1	not used
2 –	GND
3 +	+ 12 VDC
PE	Shield
N	not used

Instructions For Connecting And Separating Coupler

1. Before plugging, open protective caps and check plug/socket for possible damages.
2. Align socket/plug along the red arrows in groove.

1) 

2) 

3. Turn socket/plug right by approx. 45° to stop.
4. Push socket/plug together until they lock and are held by the blue hook.

3) 

4) 

Disconnect in reverse order.

Ex	Absolutely adhere to operating instructions 'DXN' supplied by Marechal.
	Components must have identical coding to avoid damages to connector/socket.
	The supply cable to the plug-and-socket connection must be firmly installed and sufficienty protected against mechanical damage. Cables must comply with the thermic and mechanical requirements at the site of installation.
	When connectors are not connected correctly, protection against risk of explosion is no longer warranted. Strictly follow the instructions!
	After separating, immediately cover components of the plug-and-socket connection conducting voltage with protective cap!

6.7 Connection Of Scale

6.7.1 Connection Of Loadcells

The scale interface module ADM-Exi is plugged into the socket provided on the CPU3000Exi and must be fastened with the knurled screws that are part of the delivery.

The **A**nalog **D**igital **M**odul ADM-Exi provides connection of one analog Ex scale base as specified below:

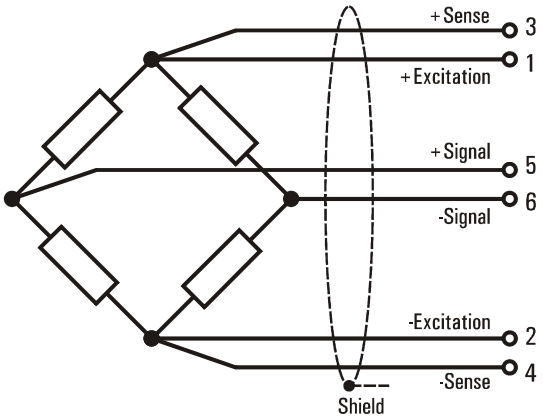
- Intrinsically safe strain gauge loadcells with an overall impedance from 87.5 Ω to 4500 Ω
- Connection in 4- or 6-wire technique.

Ex **Documented evidence of intrinsic safety in compliance with EN 60079-14 is required.**

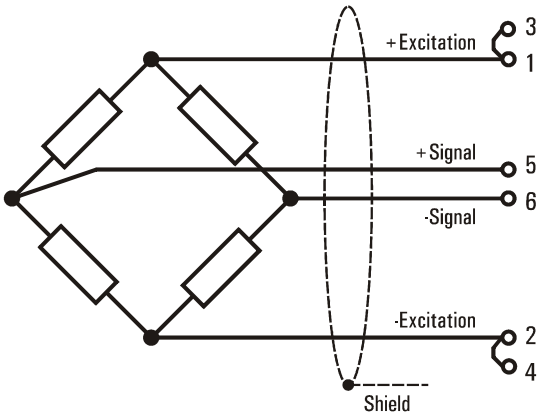
The following connection values must be observed:

Cross section of rigid wires:	0.14 – 1.5 mm²
Cross section of stranded wires with wire end ferrules:	0.25 – 1.5 mm²
Length of stripped wire:	6 mm
Torque of screw terminal:	0.5 – 0.6 Nm

Principal schematics of 6-wire and 4-wire Ex strain gage loadcell

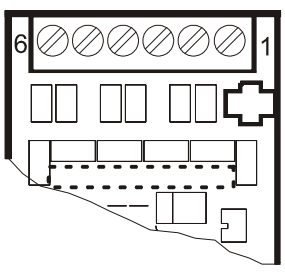


6-wire loadcell



4-wire loadcell

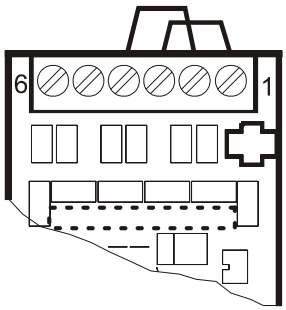
Connection of 6-wire Ex loadcell to ADM-Exi module



Module: ADM-Exi Terminal: KL1 Terminal assignment	
1	+ Excitation
2	– Excitation
3	+ Sense
4	– Sense
5	+ Signal
6	– Signal

Connection of 4-wire Ex loadcell to ADM-Exi module:

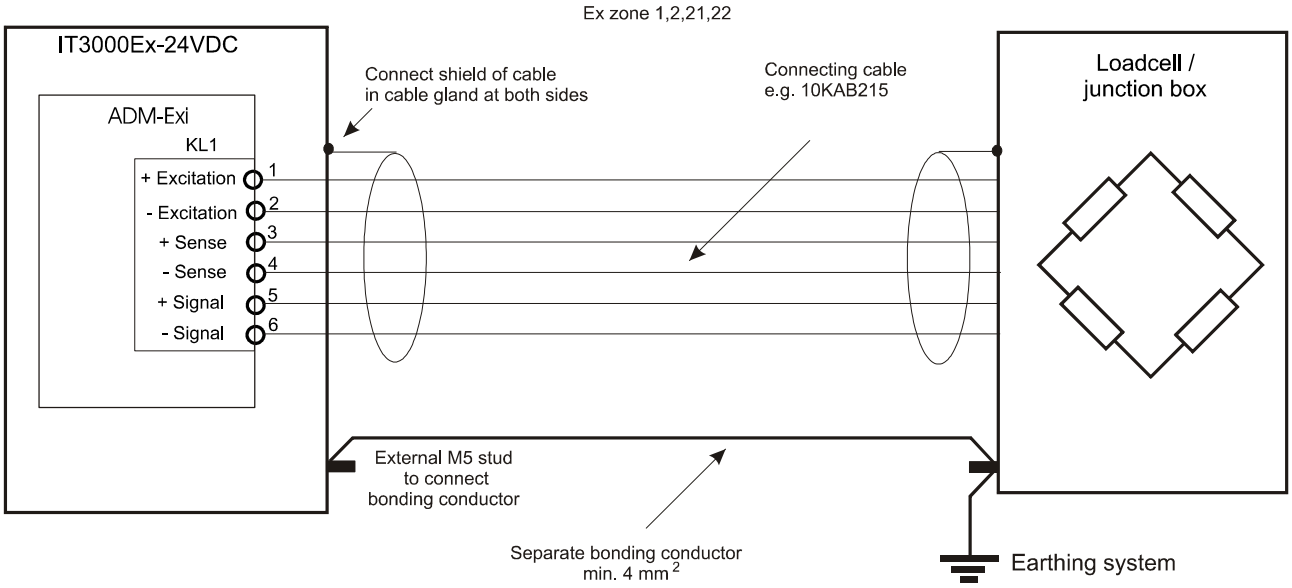
To connect loadcells without sense lines (4-wire connection), two jump leads must be connected at terminal row KL1 between terminal 1 and 3, and between terminal 2 and 4.



Module: ADM-Exi **Terminal: KL1** **Terminal assignment**	
1	+ Excitation
2	– Excitation
3	+ Excitation
4	– Excitation
5	+ Signal
6	– Signal

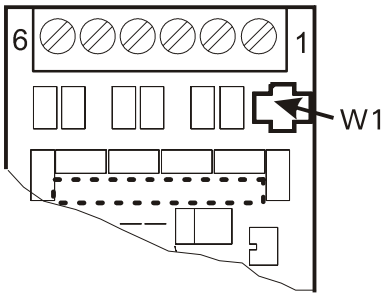
Use only suitable shielded cable, e.g. SysTec article-No. 10KAB215. Connect shield on both sides.

Principal schematics for connection of ADM-Exi to 6-wire loadcell / junction box

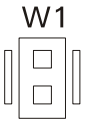


6.7.2 Securing Scale Parameters (W&M Approved Applications)

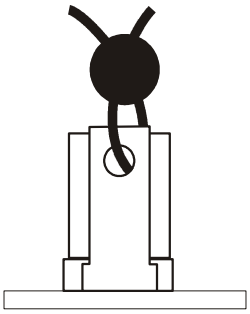
The scale parameters are stored in EEPROM and secured with the jumper W1:



Calibration data secured



W&M approved applications require that the calibration parameters be protected against unauthorized modifications. To that effect the jumper can be sealed with thread and lead seal.



For a description of the scale calibration refer to the respective chapter.

6.8 Connection Of Interfaces

6.8.1 Serial Intrinsically Safe Interface

The interfac module SIM-10mA-Exi is plugged into the SIM socket provided on the CPU3000Exi and must be fastened with the knurled screws that are part of the delivery.

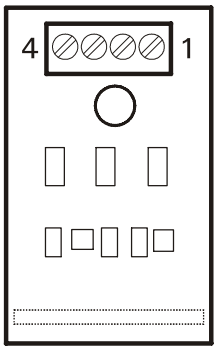
The SIM-10mA-Exi permits the connection of the interface coupler TS3000 or the ExtensionBox by means of an intrinsically safe 10mA interface.

Ex

Documented evidence of intrinsic safety in compliance with EN 60079-14 is required.

The following connection values must be observed:

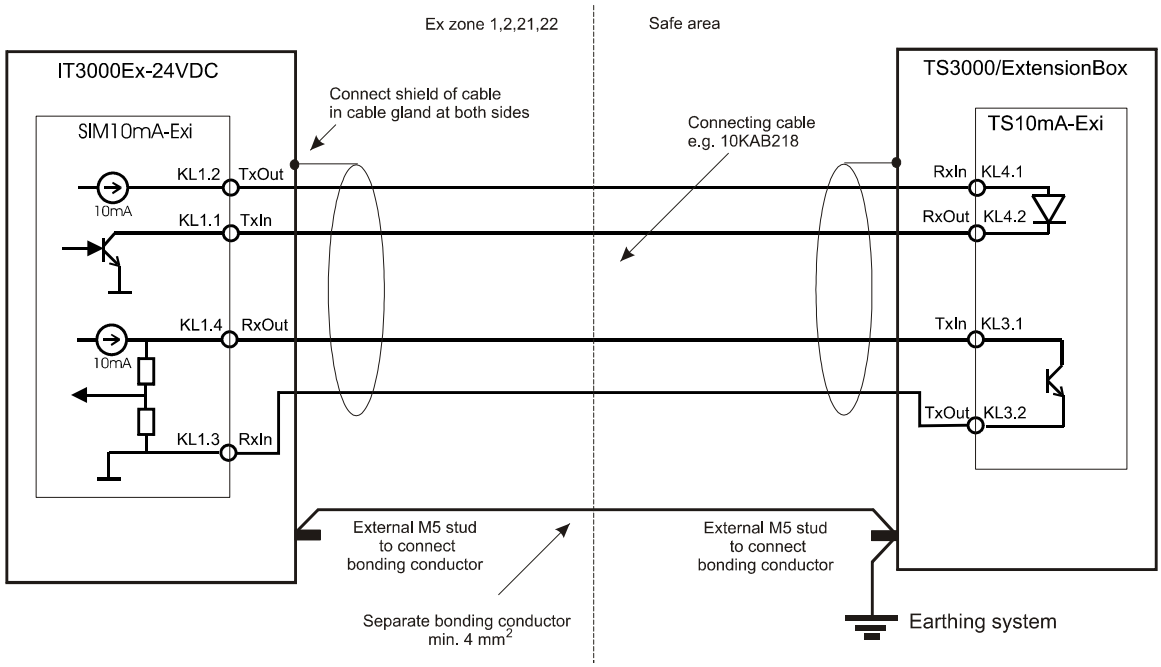
Cross section of rigid wires:	0.14 – 1.5 mm^2
Cross section of stranded wires with wire end ferrules:	0.25 – 1.5 mm^2
Length of stripped wire:	6 mm
Torque of screw terminal:	0.5 – 0.6 Nm



Module: SIM-10mA-Exi **Terminal: KL1** **Terminal Assignment**	
1	Tx In
2	Tx Out
3	Rx In
4	Rx Out

The interface coupler TS3000 or the ExtensionBox must be installed in safe area. The weighing terminal and the interface coupler or ExtensionBox must be integrated into the equipotential bonding of the installation. Only suitable shielded cable e.g. SysTec article-No. 10KAB218 may be used. The shield must be connected on both sides.

Principal schematics for connection of SIM-10mA-Exi interface to external interface coupler



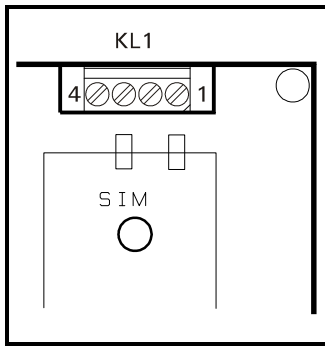
6.8.2 Digital Inputs

The intrinsically safe inputs are accessible on the CPU3000Exi at terminal KL1. Two potential free contacts can be connected.

> **Ex** **Documented evidence of intrinsic safety in compliance with EN 60079-14 is required.**

The following connection values must be observed:

Cross section of rigid wires:	0.14 – 1.5 mm^2
Cross section of stranded wires with wire end ferrules:	0.25 – 1.5 mm^2
Length of stripped wire:	7 mm
Torque of screw terminal:	0.5 – 0.6 Nm

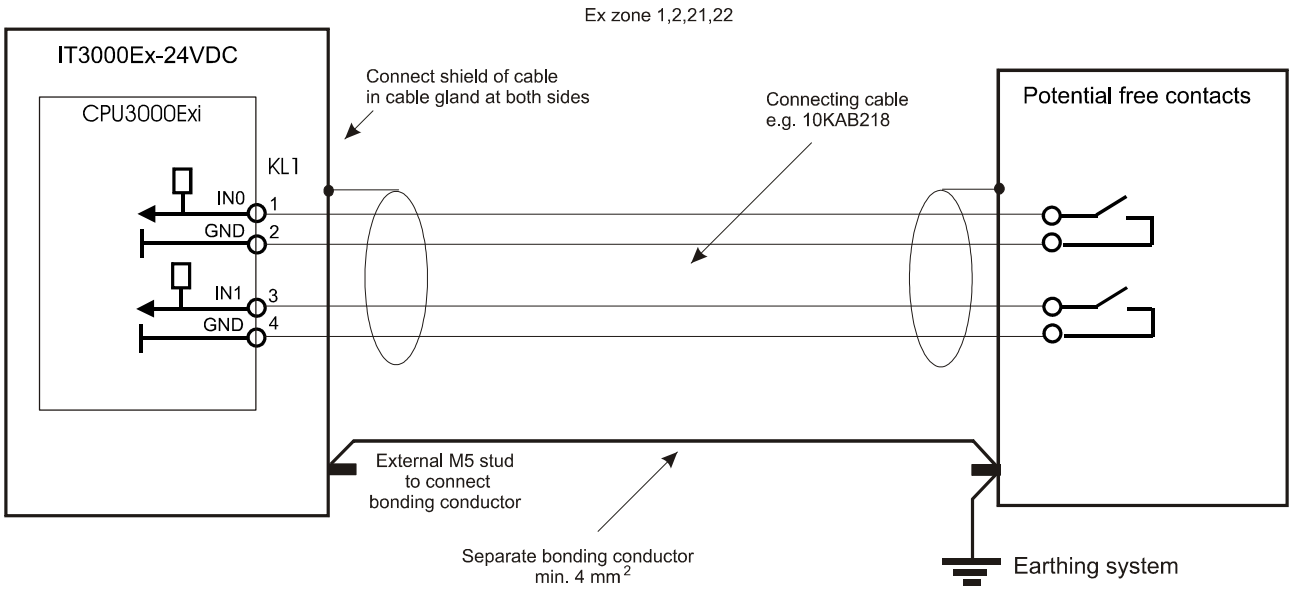


Module: CPU3000Exi
Terminal: KL1
Terminal assignment

1	IN0
2	GND
3	IN1
4	GND

Only suitable shielded cable e.g. SysTec article-No. 10KAB218 may be used. The shield must be connected on both sides.

Principal schematics for the connection of the digital inputs



6.8.3 Digital Outputs

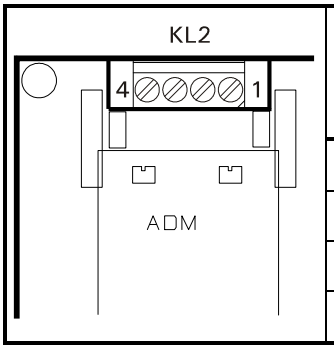
The intrinsically safe outputs are accessible on the CPU3000Exi at terminal KL2. Two intrinsically safe piezoelectric valves can be connected.

The maximum output current is 2mA @ 5VDC output voltage (see also type examination certificate at the end of this manual).

Ex **Documented evidence of intrinsic safety in compliance with EN 60079-14 is required.**

The following connection values must be observed:

Cross section of rigid wires:	0.14 – 1.5 mm^2
Cross section of stranded wires with wire end ferrules:	0.25 – 1.5 mm^2
Length of stripped wire:	7 mm
Torque of screw terminal:	0.5 – 0.6 Nm

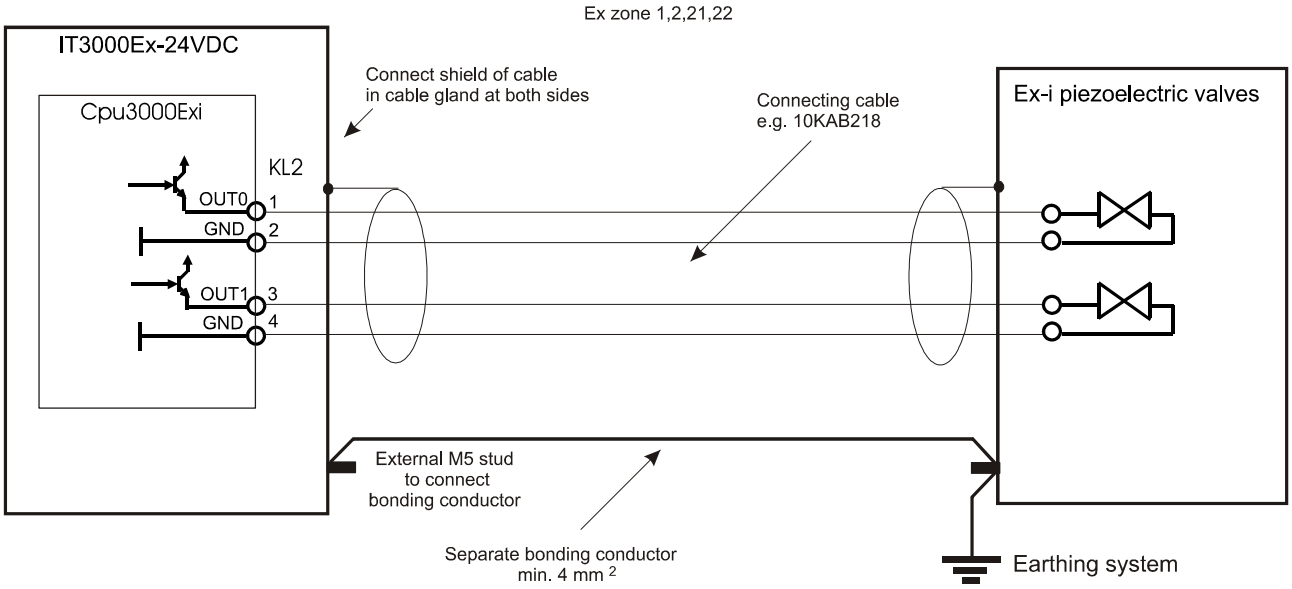


Module: CPU3000Exi
Terminal: KL2
Terminal assignment

1	OUT0
2	GND
3	OUT1
4	GND

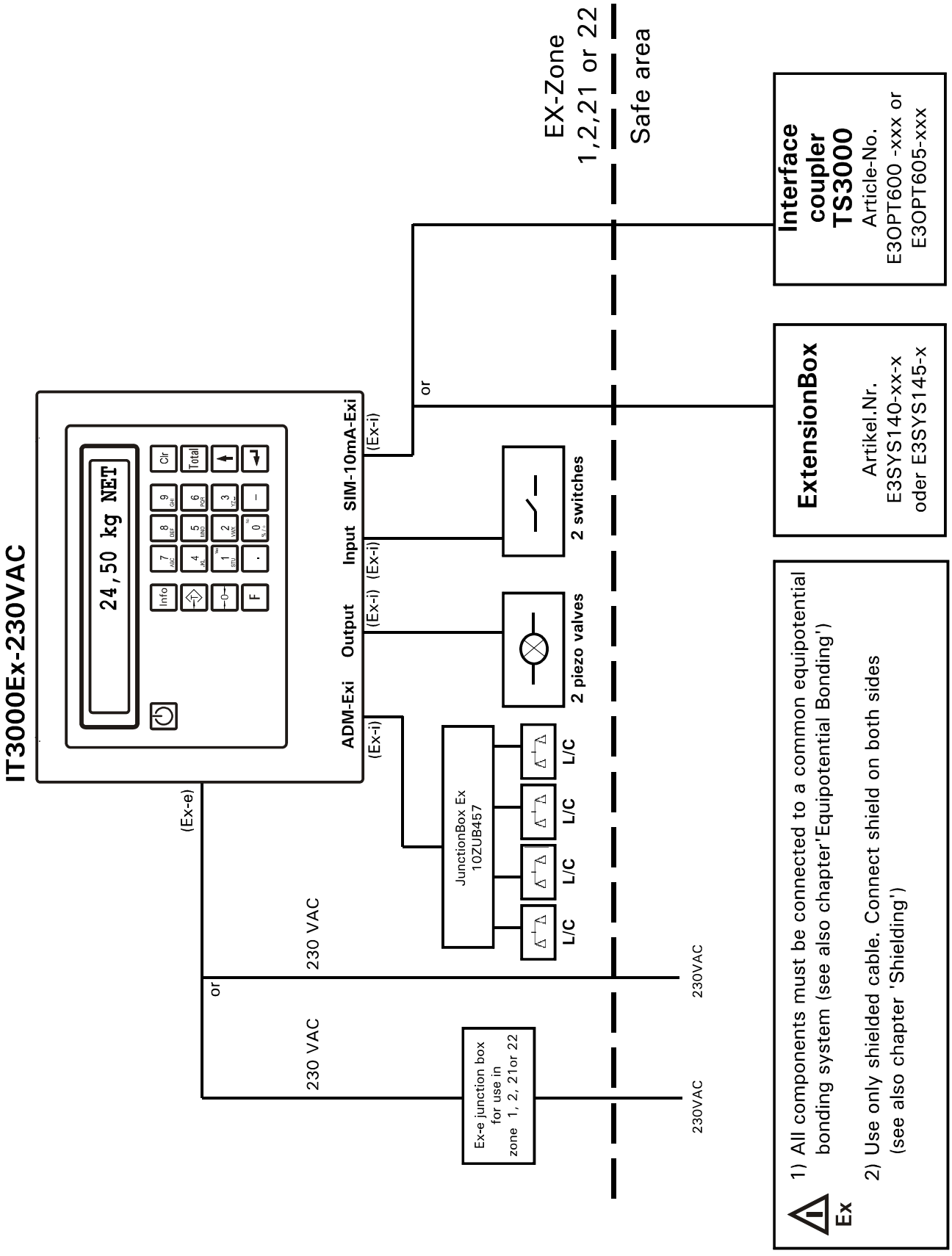
Only suitable shielded cable e.g. SysTec article-No. 10KAB218 may be used. The shield must be connected on both sides.

Principal schematics for the connection of the digital outputs



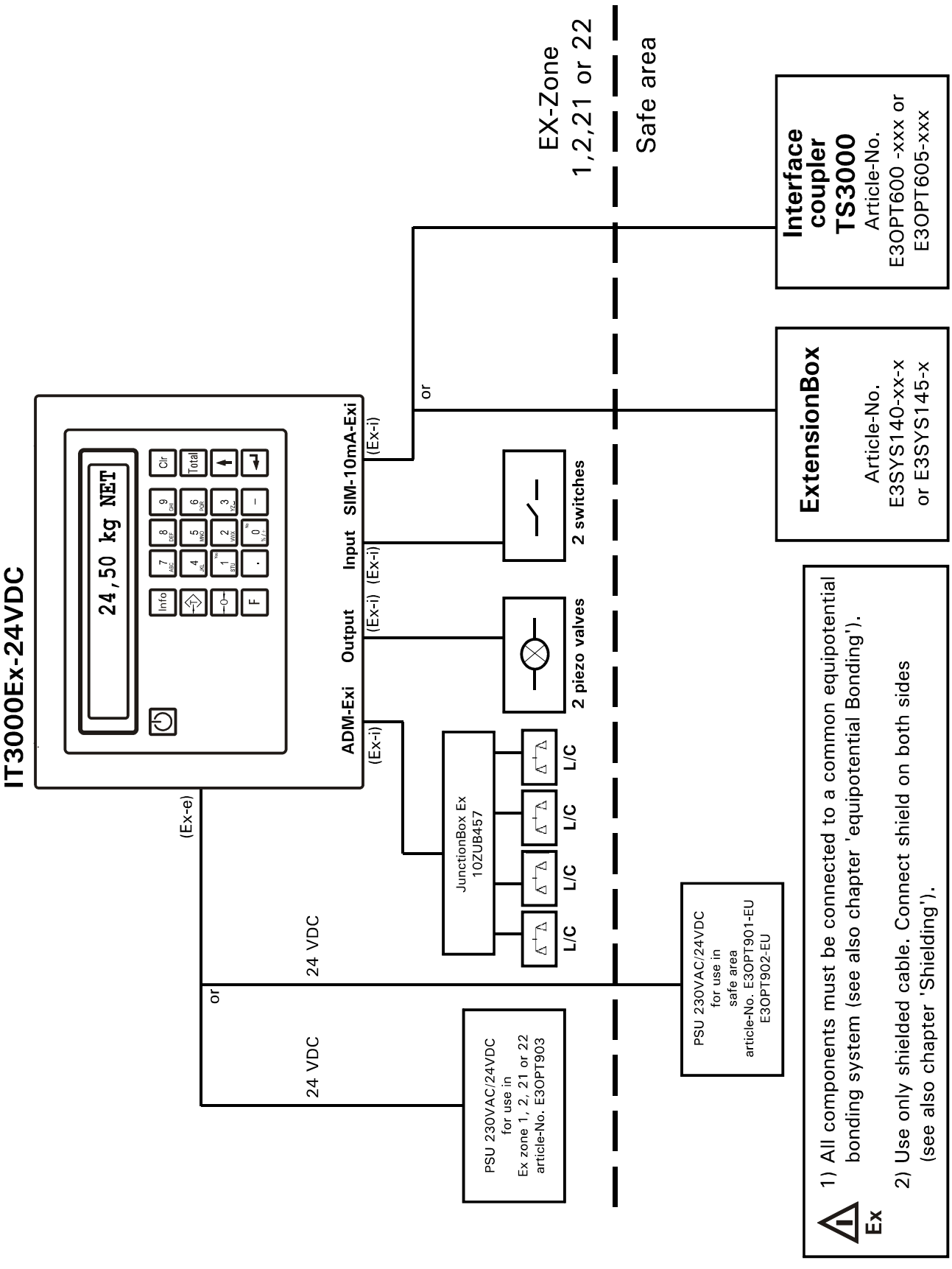
6.9 Installation Example IT3000Ex-230VAC

Shown below is a typical system configuration:



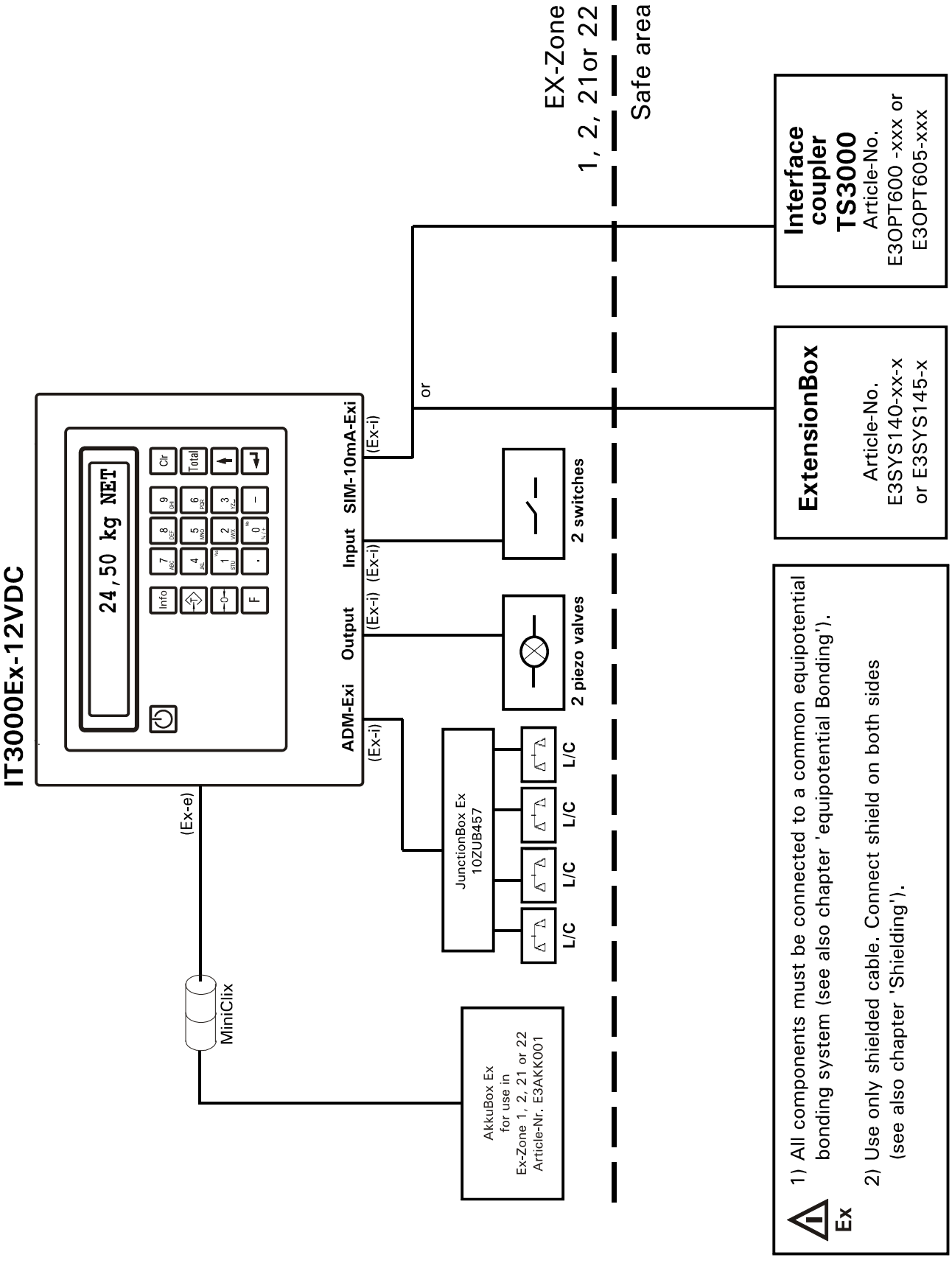
6.10 Installation Example IT3000Ex-24VDC

Shown below is a typical system configuration:



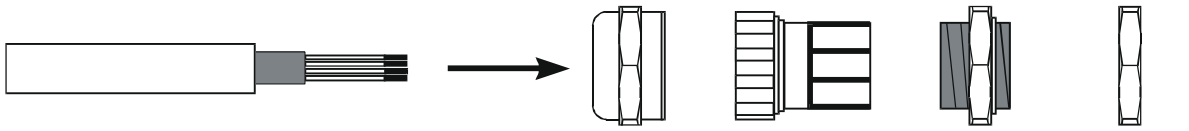
6.11 Installation Example IT3000Ex-12VDC

Shown below is a typical system configuration:



6.12 Installation Of Cables

All cables are led into the housing through cable glands.



Cable connection through cable glands:

1. Slide compression nut over cable jacket;
2. Slide plastic insert (retainer) over cable jacket until inner end is aligned with cut end of jacket;
3. Unravel shield, bend over retainer and push into retaining comb to ensure good conductive contact with housing. Cut wires of shield to length of comb, avoid protruding wires that would endanger tightness of cable gland;
4. Insert retainer with cable into bushing;
5. Screw compression nut onto bushing and use wrench to tighten securely.

Permissible diameter of cable and torque for cable glands:

Size of wrench for compression nut	Permissible diameter of cable	Torque of compression nut
20 mm	6 – 10 mm	5 Nm

For deviating diameters of cable contact SysTec service.

Ex **In order to meet the installation requirements of EN60079-14 section 9.3.1, all connection cables must be firmly installed to avoid tensile strain at the cable glands.**

Ex **Use crimped wire end ferrules with plastic collar on stranded cables and avoid protruding wires!**

7 Commissioning

7.1 General

Prior to start up follow the check list below:

Ex	Check to make sure that during commissioning no potentially explosive atmosphere can be present.
	Check whether the conditions concerning the intended use are fulfilled (see section 'Utilization').
	Check assembly as described in 'Assembly'.
	Check of installation (equipotential bonding, connection of external components) as described in chapter 'Installation'.
	Check of documented evidence of intrinsic safety in compliance with EN 60079-14.
	Check whether housing is thoroughly closed with all hexagonal srews tightly fastened.
	Check to make sure that the components connected to the outputs and interfaces (valves, movable parts) cannot cause any damage.
	Switch on supply voltage.
	Switch on weighing terminal by means of On/Off switch.
	Configure weighing terminal (interface parameters...) in the Service Mode as described in section 'Service Mode'.
	Calibrate scale in Service Mode as described in 'Service Mode'.
	Test inputs/outputs, serial interface and scale function in Service Mode as described in section 'Hardware Test'.

8 Configuration Of Scale Interface Module

8.1.1 Multiple-Range Scale

Calibration is possible as Single, Dual or Triple Range Scale. The different ranges have different capacities and scale intervals.

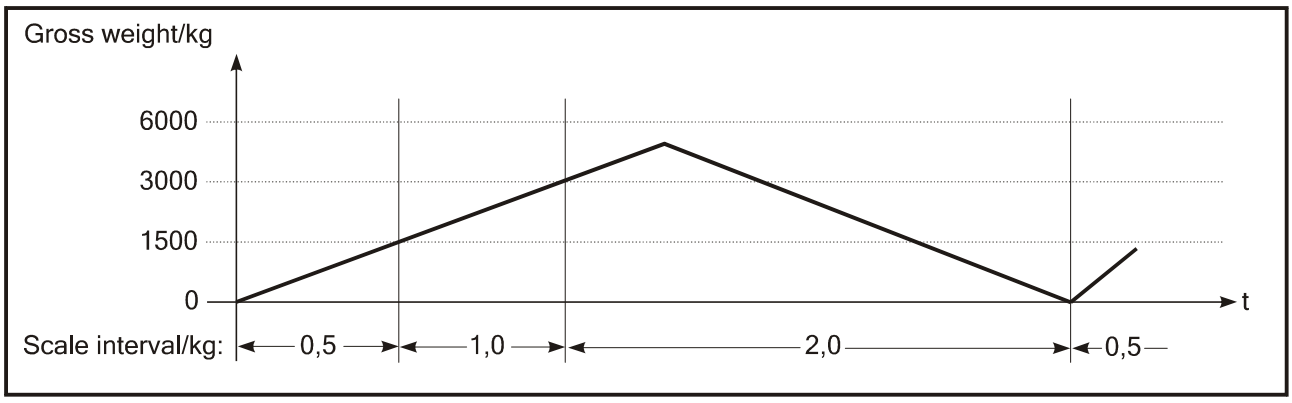
Example: Triple Range Scale with a resolution of 3000 increments for each range:

First range:	0 – 1500kg / 0.5kg
Second range:	0 – 3000kg / 1.0kg
Third range:	0 – 6000kg / 2.0kg

When a Multiple Range Scale is loaded, the scale display changes automatically from a lower to a higher range. During unloading of the scale, the scale display remains in the higher range. If the scale was tared (weighing in net mode), on return to gross zero the tare is only cleared when the tare key is pressed. Only after clearing the tare, the display returns to gross mode and switches back to the smallest range.

Automatic switching back to the smallest range on reaching zero is only carried out if the scale was not tared (weighing in gross mode).

Example of a weight curve for loading and unloading a Multiple Range Scale showing the weight and the displayed scale interval:



When the scale is loaded further after it was tared, the tare weight is rounded automatically to the next scale interval as soon as the display is switched from one range to the next. The maximum tare weight corresponds to the capacity in the highest range.

The Multiple Range Scale provides weighing of light and heavy loads on the same scale with a high degree of accuracy.

When configuring a Multiple Range Scale, capacity and scale interval for all ranges can be chosen freely, only a restriction applies for the configuration of scale intervals, the decimal point location must be identical for all ranges. Example: Use 0.5kg and 1.0kg instead of 0.5kg and 1kg.

The maximum resolution of the loadcells (e.g. 3000d) must not be exceeded in any of the scale ranges.

8.1.2 Multi-Interval Scale

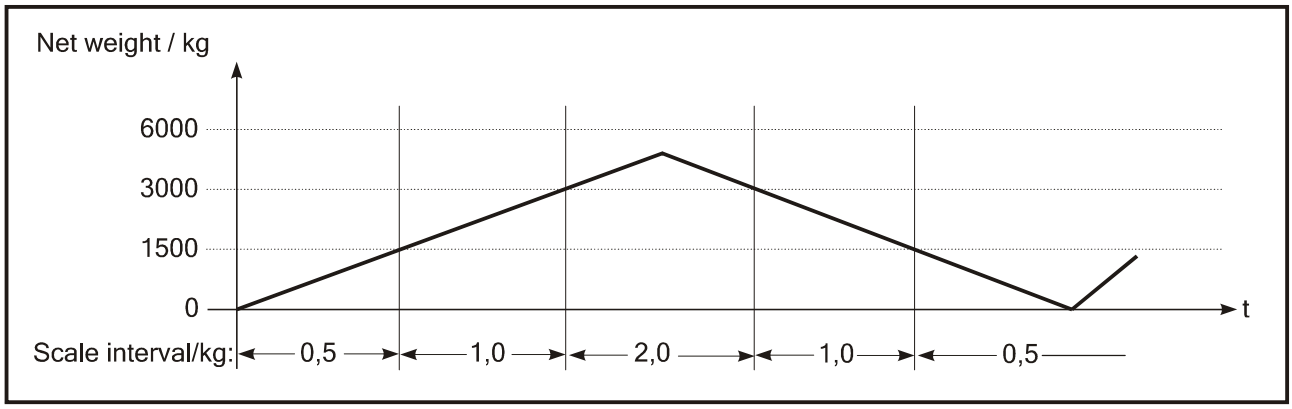
A Single Range Scale can be configured as Multi-Interval Scale with two or three different interval ranges.

Example for a Triple Interval Scale:

First interval range:	0kg	–	1500kg / 0.5kg
Second interval range:	1500kg	–	3000kg / 1.0kg
Third interval range:	3000kg	–	6000kg / 2.0kg

The scale display changes automatically from one interval range to the next during loading and unloading of the scale.

Example weight curve for loading and unloading a Multi Interval Scale showing the weight and the scale interval displayed:



After taring the scale, the scale display shows the net weight with the smallest scale interval. Small weights are shown with the highest accuracy, even when the scale is already loaded to a higher weighing range. Restriction: The max. permitted manually entered tare weight must not exceed the weight of the range with the smallest interval.

For the configuration of a Multi-Interval scale all ranges and scale intervals can be chosen freely.

8.1.3 Adaptation To Scale Environment

The following parameters can be set to obtain optimum weighing results:

- Motion window size and number of measurments for motion detector
- Filter strength of the digital filter for unstable scales
- Auto Zero Range for Auto Zero Function
- Pushbutton Zero Range for Zero-key
- Power Up Zero Range
- Overload threshold for display blanking.

8.1.4 Setting Of Geo Value

Before calibrating the scale, the Geo Value must be entered, e.g. Great Britain = 21 (see also chapter Geo Values). If the scale is calibrated at one location and moved to another location later, it is sufficient to re-enter the Geo Value of the new location.

8.1.5 Weights & Measures Approved Applications

The highest W&M certified resolution (Scale Capacity / Scale Interval) is 6000 increments (with a max. of 80% deadload).

W&M approved installations require parameter setting in the group 'Adaptation' as follows:

- Motion Window: 0.5d
- Motion Counter: ≥7
- Auto Zero Range: 0.5d
- Pushbutton Zero: ±2%
- Power Up Zero: ±2% or ±10% ***)**
- Overload: max. 9 d

***)** Depending on the application, also the setting 'Off' may be acceptable, e.g. for hopper scales.

Under menu item 'W&M Info' the conformity of settings with W&M requirements can be checked.

The scale settings are stored in an EEPROM and secured with the jumper W1 which can be sealed by Weights & Measures with thread and lead seal to prevent unauthorized modification.

9 Service Mode

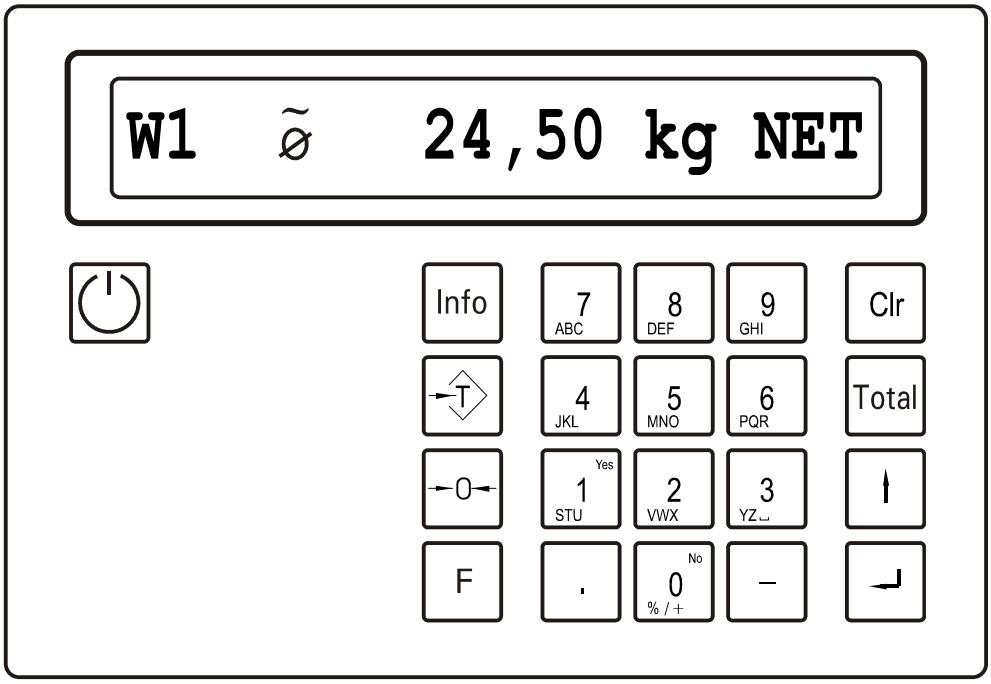
9.1 General

The Service Mode is a program for configuration, calibration and hardware test of the IT3000Ex weighing terminal. In the configuration the operating sequence and the print format are defined. The following sections give an introduction on how to operate the terminal via keyboard and display and describe the individual functions of the Service Mode.

Notes:

- IT3000Ex and its associated equipment must be installed, adjusted and maintained by qualified personnel only!
- Before accessing the Service Mode all peripheral devices must be installed and configured!
- Access to the Service Mode is protected by the Service Password (see also last page of this manual).
- Inappropriate changes of Service Mode settings may lead to malfunction and errors in the operating sequence!

9.2 Display And Keyboard



Display line		Gross or net weight or operator prompt and entry
	⌀	Symbol: Scale in gross zero range (±0.2d)
	~	Symbol: Scale in motion
On-key	⏻	Terminal On / Off
Info and scale keys	**Info**	Scrolling forward, call up Service Mode in the initial step
	→T←	Taring (Autotare), if scale is tared: clear tare
	→0←	Set gross weight to zero
Function keys	**F1 - F8**	Press F-key and numeric key (1 - 8) subsequently to access function defined in application program;
	F0	Switch weight display to tenfold resolution (in the basic step of the sequence), display falls back to normal mode after approx. 5 sec.
Special keys	**Clr**	Numeric entry: press key once → clear entry Alphanumeric entry: short key stroke → clear last character (can be repeated several times to clear more than one character); hold key down for approx. 1 sec → clear the whole entry
	↑	Return to previous program step
	↵	Confirm entry, continue with next program step
	Total	Anzeige / Druck der aufsummierten Werte (wenn entsprechend in Ablauf und Druckmuster konfiguriert)
Numeric keypad		Entry of numeric data, confirmation 'Yes' (=1) - 'No' (=0) and entry of alpha characters via multiple key assignment

9.2.1 Multiple Assignment Of Numeric Keypad

Where applicable in the application program, an alphanumeric entry is made by selecting the respective character with a sequence of short keystrokes. If a key is pressed repeatedly within a period of approx. 0.5 seconds, the display shows the other characters also assigned to this key one after the other.

Example:

Key pressed:	5	5	5	5	5	5	5	5	
Display:	5	M	N	O	m	n	o	5	etc.

To enter the letter 'n' the key 5 must be pressed six times until 'n' appears on the display. If the entry is paused for longer than 0.5 sec, the cursor moves on to the next character. If any other key is pressed, entry continues in the position of the next character immediately.

An incorrect entry can either be corrected by deleting the last character (short key stroke on Clr-key) or by clearing the complete entry (Clr-key pressed for longer than 0.5 sec). By pressing the Clr-key repeatedly, it is possible to delete several characters one after the other.

9.3 Operator Prompting

The following sections describe the operating sequence of the weighing terminal with operator prompts and the requested entries.

The contents of the terminal display is shown in a frame on the left hand side. Next to the display the possible operator entries are listed, on the right hand side comments and explanations are shown.

`Password ????`	Entry of 4-character password
	↑ Return to normal operation

Prompts or entries that apply only under certain conditions are shown in an extra frame. The condition is shown in bold face in the upper left hand corner of the frame.

PC not ready:

`PC Not Ready !`	Error message: PC is not ready for data transmission

This message is only displayed when an error occurs.

↵ -key (Enter) and ↑-key

In all program steps, unless otherwise specified, the ↵ -key (Enter) leads to the next step. Pressing the ↑ -key leads to the previous step.

Confirmation with Y (1) or N (0)

A positive confirmation of a question, e.g. 'Save parameters? Y' is given by pressing 1 and subsequently the ↵ -key (Enter). 0 and ↵ indicates a negative confirmation, in this example the parameters are not saved.

9.4 Overview

After powering the terminal up, the messages with display of program version and date and time are displayed.

Note: If the weighing terminal was powered down for a longer period of time, it might be necessary to again enter date and time.

By pressing the Info-key while the power up messages are displayed, the Service Mode is called up. After that the program proceeds to the initial step.

Power up:

`Version 9.99 999999`		Number and date of version, display for approx. 1.5 sec
	Info	Call up Service Mode
`03.09.01 10:41`		Date and time, display for approx. 1.5 sec
	Info	Call up Service Mode
`Application: Basic`		Selected operating mode, display for approx. 1.5 sec
	Info	Call up Service Mode

Service Mode:

`Service Mode`		
`Password ????`		Entry of 4-character Service Password
	↑	Return to normal operation

Service Mode menu:

`Service: Interface`		Configure interfaces; (see chapter 'Interface Configuration')
	Info	Use Info-key to scroll through groups
	↵	Call up displayed group
`Service: Format`		Configure operating sequence and printout; (see chapter 'Configuration Of Data Entry And Print Formats')
`Service: General`		Enter setup parameters (language, format of date, basic sequence, field 33 - 34); (see chapter 'Entry Of Parameters')
`Service: Calibrate`		Waage kalibrieren (siehe Kapitel 'Waage kalibrieren')
`Service: Backup`		Backup of data on PC; (see chapter 'Backup')
`Service: Restore`		Restore data from PC; (see chapter 'Restore')

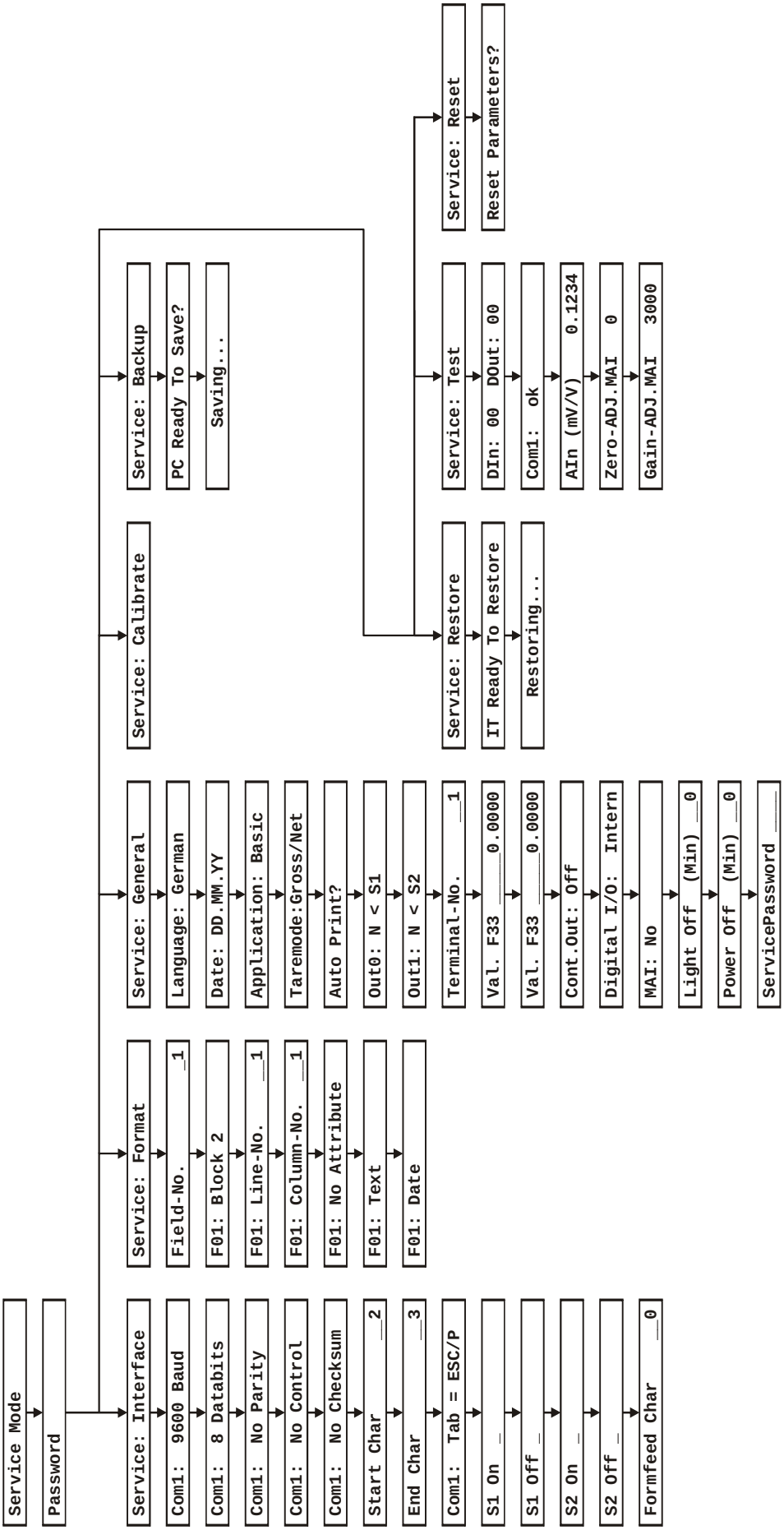
Service: Test		Test hardware; (see chapter 'Harware Test')
Service: Reset		Test hardware; (see chapter 'Reset')

Exit Service Mode:

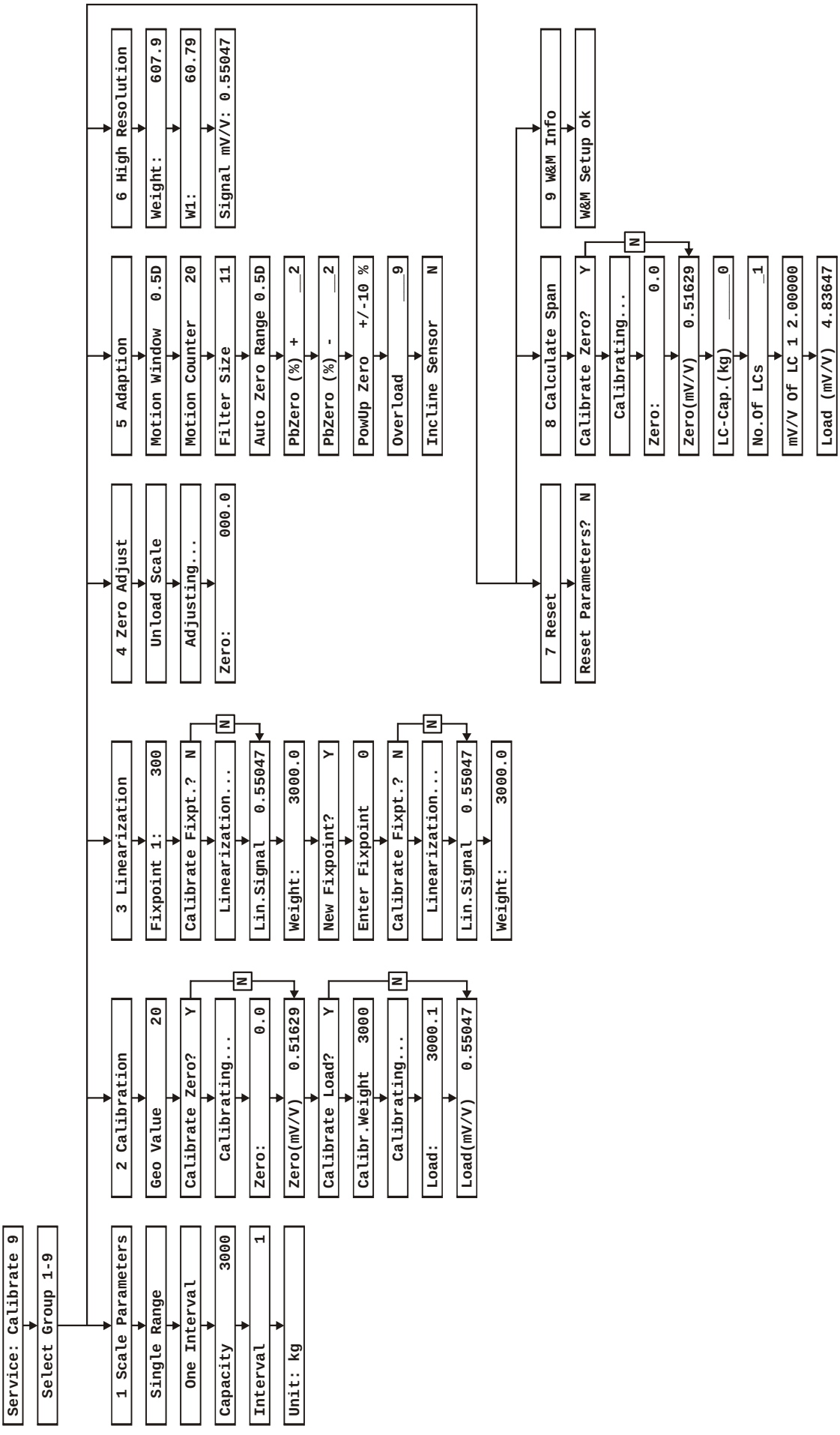
Saving...	↑	Exit Service Mode and store changes, return to normal operation

9.5 Overview Service Mode

Part 1



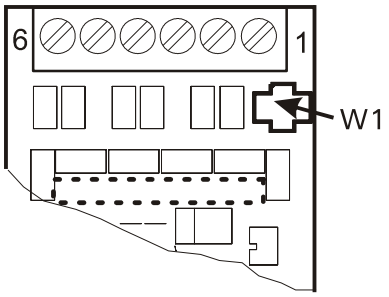
Part 2


Service: Calibrate 9
Select Group 1-9
1 Scale Parameters
Single Range
One Interval
Capacity 3000
Interval 1
Unit: kg
2 Calibration
Geo Value 20
Calibrate Zero? Y
N
Calibrating...
Zero: 0.0
Zero(mV/V) 0.51629
Calibrate Load? Y
Calibr.Weight 3000
N
Calibrating...
Load: 3000.1
Load(mV/V) 0.55047
3 Linearization
Fixpoint 1: 300
Calibrate Fixpt.? N
N
Linearization...
Lin.Signal 0.55047
Weight: 3000.0
New Fixpoint? Y
Enter Fixpoint 0
Calibrate Fixpt.? N
N
Linearization...
Lin.Signal 0.55047
Weight: 3000.0
4 Zero Adjust
Unload Scale
Adjusting...
Zero: 000.0
5 Adaption
Motion Window 0.5D
Motion Counter 20
Filter Size 11
Auto Zero Range 0.5D
PbZero (%) + 2
PbZero (%) - 2
PowUp Zero +/-10 %
Overload 9
Incline Sensor N
6 High Resolution
Weight: 607.9
W1: 60.79
Signal mV/V: 0.55047
7 Reset
Reset Parameters? N
8 Calculate Span
Calibrate Zero? Y
N
Calibrating...
Zero: 0.0
Zero(mV/V) 0.51629
LC-Cap.(kg) 0
No.Of LCs 1
mV/V Of LC 1 2.00000
Load (mV/V) 4.83647
9 W&M Info
W&M Setup ok

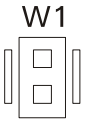
10 Calibration

10.1 Entering Calibration Mode

Prior to power up the jumper W1 on the scale interface module must be removed. Only with this jumper setting can the changed parameters be saved in memory after the calibration.



Calibration released



Following below the individual steps of the calibration are described. Additional information is provided in the chapter 'Scale Connection'.

10.2 Select Group

After entering the calibration mode, the first menu item is displayed:

`Service: Calibrate`		Calibrate scale
	↵	

If jumper W1 is still in place:

`Calibration Locked`		Warning: jumper not in calibration position, parameters cannot be saved!
	↵	Enter calibration mode without saving (e.g. to check settings)

`Select Group 1-9`		Select parameter group:
	1	Scale Parameters
	2	Calibration
	3	Linearize
	4	Zero Adjust
	5	Adaptation
	6	High Resolution
	7	Reset
	8	Calculate Span
	9	W&M Info (check W&M relevant parameters)
	Info	Scrolling forward
	↑	Save changes and return to menu

The parameter setting and calibration follows the sequence of the group numbers (1, 2, 3, 4) as described in the following chapters. After pressing the ↑-key in step '`Select Group 1-7`', the display shows the message:

Save Parameters? Y	Save parameters in EEPROM

Info Y: Save parameters
N: Ignore all changes, do not save data

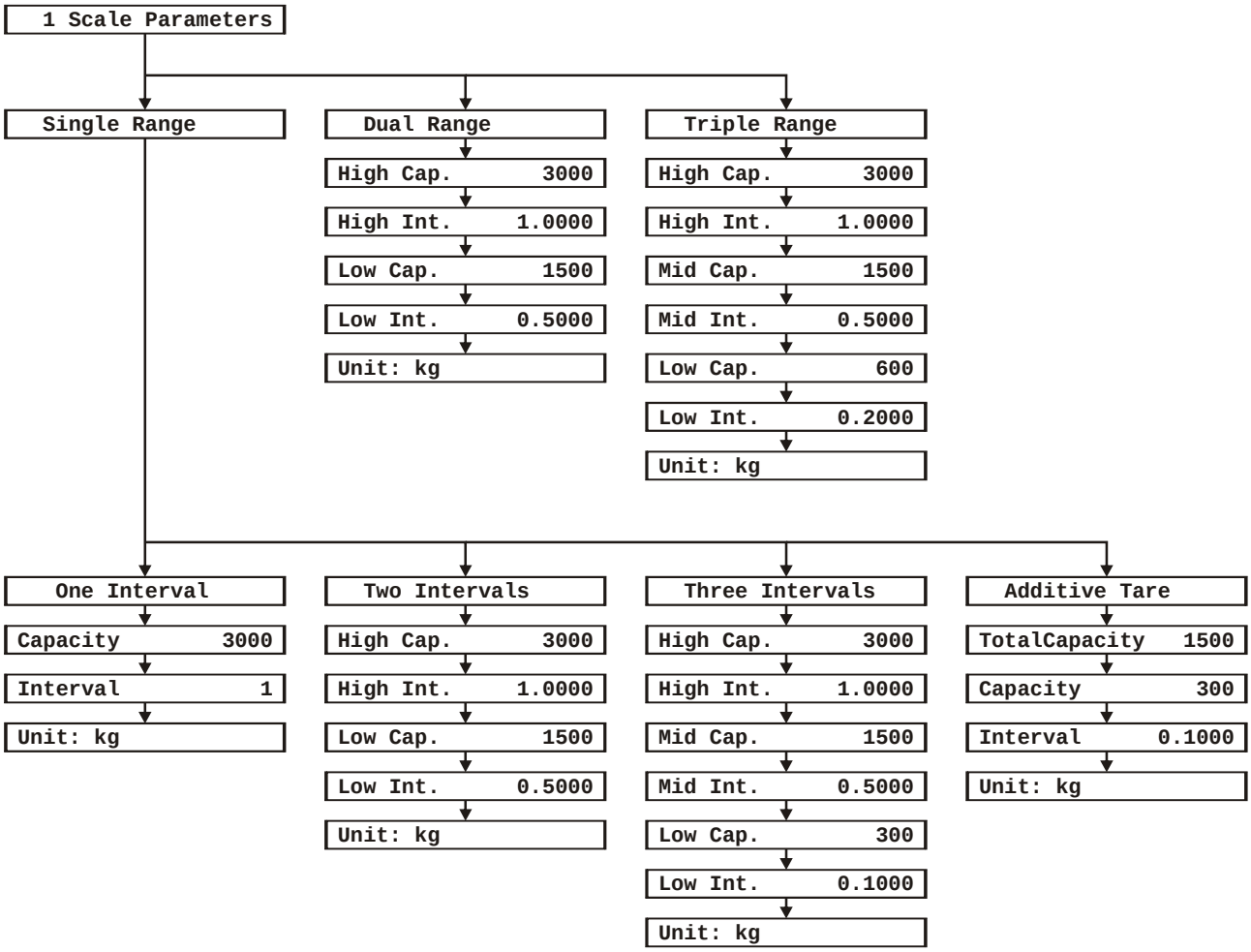
If jumper W1 on ADM module is still in place:

Error Calibr. Jumper	Error message: jumper not in calibration position, parameters cannot be saved!
↵	Exit calibration without saving

10.3 Scale Parameters

In this group the weighing ranges, scale intervals and the scale unit are selected. The scale can be configured as Single Range, Dual Range or Triple Range Scale. A Single Range Scale can be configured as Multi Interval Scale with two or three different scale intervals.

1 Scale Parameters	
1	Scale Parameters



Single Range	**Info**	Select number of scale ranges: Single Range: Single Range Scale with one, two or three intervals Dual Range: Scale with two ranges Triple Range: Scale with three ranges

If 'Single Range' has been selected:

One Interval	**Info**	A Single Range Scale can be configured as Single- or Multi-Interval Scale: One Interval or Two Intervals or Three Intervals or Additive Tare = Single Range scale with additive tare (not for W&M approved applications)

If 'Single Range' and 'One Interval' has been selected:

Capacity 999999	Single Range capacity entry (6 digits). Example: 'Capacity 1500'
Interval 999.9999	Single Range scale interval entry (6 digits). If 'Two Intervals' or 'Three Intervals' has been selected, entry of the smallest scale interval. (See also chapter Multi Interval Scale). Example: 'Interval 0.5000' Valid entries are: 0.0001, 0.0002, 0.0005, 0.0010, 0.0020, 0.0050, 0.0100, 0.0200, 0.0500, 0.1000, 0.2000, 0.5000, 1.0000, 2.0000, 5.0000, 10.0000, 20.0000, 50.0000, 100.0000, 200.0000, 500.0000.

If multiple-range 'Dual Range' or multi-interval 'Two Intervals' has been selected:

High Cap. 999999	Enter capacity in the higher range (6 digits). Example: 'High Cap. 6000'
High Int. 999.9999	Enter interval in the higher range. Example: 'High Int. 2.0000'
Low Cap. 999999	Enter capacity in the lower range (6 digits). Example: 'Low Cap. 3000'
Low Int. 999.9999	Enter interval in the lower range. Example: 'Low Int. 1.0000'

If multiple-range 'Triple Range' or multi-interval 'Three Intervals' has been selected:

High Cap. 999999	Entry of capacity of the highest range (6 digits) Example: 'High Cap. 6000'
High Int. 999.9999	Entry of interval of the highest range Example: 'High Int. 2.0000'
Mid Cap. 999999	Entry of capacity of the medium range (6 digits) Example: 'Mid Cap. 3000'
Mid Int. 999.9999	Entry of interval of the medium range (6 digits) Example: 'Mid Int. 1.0000'
Low Cap. 999999	Entry of capacity of the lowest range (6 digits) Example: 'Low Cap. 1500'
Low Int. 999.9999	Entry of interval of the lowest scale range Example: 'Low Int. 0.5000'

If 'Single Range' has been selected with 'Additive Tare':

TotalCapacity 999999	Entry of total scale capacity. Example: 'TotalCapacity 1500'
Capacity 999999	Entry of weighing range. Example: 'Capacity 300'
Interval 999.9999	Entry of interval. Example: 'Interval 0.1000'

Unit kg	**Info**	Select a unit: kg, g, t, lb
	↵	Return to 'Select Group'

10.4 Calibration

The zero calibration and maximum load calibration are performed in this group. Instead of calibrating to maximum load, a calibration with partial load is also possible.

The Geo Value entry permits the calibration at one place even if the scale is to be operated at a different location. This compensates for the different forces of gravity without recalibration (not for W&M approved applications). By means of entering the rated signals (mV/V), a scale can also be precalibrated without test weights (see also chapter 'Precalibration').

2 Calibration

Geo Value 99	Entry of Geo Value. Enter the applicable Geo Value of the *calibration* location (see also chapter Geo Values). If Geo Value of place of *installation* is different, that can be changed later.

`Calibrate Zero? Y`	Scale Zero Calibration. Unload the scale and confirm to start the calibration.
Info	Scrolling Yes: Calibrate Zero No: Continue in step '`Zero(mV/V)`'
↵	Zero Calibration
`Calibrating...`	Measuring Zero signal. Message for approx. 6 sec
`Zero: 9999999`	Displays actual weight with tenfold resolution (for verification).
↑	Return to step '`Geo Value`'
↵	Continue
`Zero(mV/V): 9999999`	Display of rated signal (e.g. 0.23785)
↑	Return to step '`Select Group`'
Clr	Clear value and enter new one
↵	Continue with Span calibration

Note: If Zero calibration parameters are to be stored **before** the Span calibration, the Setup must be exited at this point of the sequence (return to step 'Select Group' and from there to step 'Setup'). Answer question 'Save Parameters?' with 'Yes'. After that Group 2 can be selected again to proceed with calibration, Zero calibration can now be skipped.

`Calibrate Load? Y`	Load calibration weight on scale. For best results use the highest possible calibration load.
Info	Scrolling Yes: Calibrate Load No: Continue in step '`Load(mV/V)`'
↑	Return to step '`Calibrate Zero?`'
↵	Continue
`Calibr.Weight 999999`	Default calibration weight (= weighing range), 6 digits
Clr	Clear displayed default value and enter desired calibration weight.
↵	Apply load and start calibration
`Calibrating...`	Measuring load signal. Message for approx. 3 sec.
`Load: 9999999`	Displays actual weight with tenfold resolution (for verification).
↑	Return to step '`Calibrate Load?`'
↵	Continue

`Load(mV/V):  999999`		Display of rated signal (e.g. 0.52243)
	Clr	Clear value and enter new one
	↵	Return to step '`Select Group`'

If the internal resolution is insufficient, an error message is displayed:

`Resolution Error`		The internal resolution should be at least 10 times higher than the entered resolution. Check calibration values and repeat calibration if required.
	↵	Return to '`Select Group`'

To store calibration parameters exit step 'Select Group' and answer question 'Save Parameters' with 'Yes'.

Note: If changes of calibration parameters are to be ignored, setup must be exited and question 'Save Parameters?' answered with 'No' before any other group of the calibration may be called up.

10.5 Linearization

Certain weighing inaccuracies are the result of the inherent non-linearity of the load sensor. Up to 6 linearization points can be set freely to compensate this imperfection. Linearization points should be entered at the points of the weighing curve where the greatest deviations (i.e. max. non-linearity) are experienced.

Linearization points must be smaller than the max. weighing range. The linearization algorithm interpretes the sections between two neighboring linearization points as a straight line.

`3 Linearization`

Linearization points already entered:

`Fixpoint n:  999999`		Display of linearization points (1 - max. 6)
	↑	Return to previous linearization point or step '`3 Linearization`', respectively
	↵	Continue with next linearization point
	Clr	Delete existing linearization point (press longer than 1 sec)

Clr-key pressed (longer than 1 sec) in step 'Fixpoint n: 999999':

`Delete Fixpoint?  N`	**Info**	Scrolling Yes: Delete linearization point No: Do not delete linearization point
	↑	Return to previous linearization point or step '`3 Linearization`', respectively
	↵	On Yes: Proceed to step '`New Fixpoint?`' On No: Continue with next linearization point

After deleting an existing fixpoint, the remaining ones are renumbered in rising order.

After display of the last linearization point or if no fixpoints have been entered yet:

New Fixpoint? N	**Info**	Scrolling Yes: Enter new fixpoint No: Do not enter new fixpoint
	↑	Return to previous linearization point or step '3 Linearization', respectively
	↵	On Yes: Continue On No: Return to step 'Select Group'
Enter Fixpoint999999		Press Clr-key and enter linearization weight
Calibrate Fixp.? N		Are you sure?
Linearization..		Measuring the linearization signal Message appears for approx. 6 sec
Weight: 9999999		Displays *measured* weight (without correction) with tenfold resolution (for verification). The *linearized* weight can be checked in group 'High Resol.'.
Lin.Signal 9.99999		Display of rated signal in mV/V (for verification)
	↵	Continue in step 'New Fixpoint?'

A new fixpoint can be inserted between existing ones, after that all fixpoints are renumbered in rising order.

10.6 Zero Adjust

In this group the scale's Zero point is readjusted. This feature is usefull when the calibration load was applied on an auxiliary test rig (e.g. for overhead track scales). After removing the test rig, the absolute Zero point can be adjusted.

4 Zero Adjust		
Unload Scale		Unload test rig or other loads
	↵	Start Zero Adjust
Adjusting...		Measuring the Zero signal. Message appears for approx. 6 sec
Zero: 9999999		Display of the new zero point with tenfold resolution (for verification)
	↑	Return to step 'Unload Scale'
	↵	Return to step '4 Zero Adjust'

10.7 Adaptation

In this group parameters are entered to adapt the scale to its environment.

```
 5 Adaptation
```

```
Motion Window    OFF
```

Info Entry of Motion Window Size.

A stable weight is detected (no motion) when the number of consecutive weight readings (specified in the next step) are within this window.

OFF: motion detector off

Window size: 3.0D, 2.0D, 1.0D, 0.5D

(Factory setting: 0.5D)

```
Motion Counter    99
```

Entry of number of weight readings for motion counter.

Specify the number of consecutive weight readings for no motion detection.

(Factory setting: 20)

```
Filter Size      OFF
```

Info Entry of Filter Strength (for digital weight filter).

OFF: filter off

1 to 20: light to strong filtering

(Factory setting: 11)

If the scale is very unstable (e.g. livestock scale) a strong filtering is recommended.

```
Auto Zero Range 0.5D
```

Info Select range for Automatic Zero Adjust. (E.g. enter 0.5D for a range from –0.5D to +0.5D.)

Zero tracking is enabled within the selected range.

OFF: Disable Zero Adjust

0.5D, 1.0D, 3.0D: zero tracking range

(Factory setting: 0.5D)

```
PbZero (%) +     999
```

Select +range for Pushbutton Zero and Auto Zero Tracking.

The scale can be set to Zero by pressing the Zero-key within the specified range.

(Factory setting: 2%)

```
PbZero (%) -     999
```

Select –range for Pushbutton Zero and Auto Zero Tracking.

The scale can be set to Zero by pressing the Zero-key within the specified range.

(Factory setting: 2%)

PowerUp Zero +/- 10%	**Info**	Select range for automatic Zero setting after power up. (E.g. enter 2% for a range from –2% to +2% of the scale capacity). After power up the scale will be automatically set to Zero if the weight is within the selected range. OFF: Disable Power Up Zero ±2%, ±10%: range (Factory setting: Off)
Overload 99		Select the threshold for overload blanking. (E.g. enter 9 to set the limit to capacity + 9d). The scale display shows '--------' when the scale weight exceeds the selected limit. (Factory setting: 9)
Incline Sensor? N	**Info**	Connection of incline sensor for mobile weighing on parallel input IN1: N = no incline sensor Y = incline sensor connected *)
	↵	Return to step '5 Adaptation'

*) When an incline sensor is connected and the permissible inclination exceeded, the display of the indicator is blanked. Instead of the weight only a slash '/' is shown.
Also, external taring via input IN1 is not possible.

10.8 High Resolution

In this group the weight is shown with tenfold resolution. Use this group to check the scale accuracy.

6 High Resolution		
Weight: 9999999		Display of the actual weight with tenfold resolution (for information only)
	Info	
W1 9999999		Display of the weight in normal resolution. In this step the basic weighing functions (zero setting, x10, taring) are available without leaving the calibartion mode.
	Info	
Signal mV/V: 9.99999		Display of rated signal.
	↵	Return to step '6 High Resolution'

10.9 Reset Parameters

In this group the scale parameters can be reset to default values. After resetting the parameters the scale must be reconfigured.

```
7 Reset
```

```
Reset Parameters?  N
```

Info No: Do not reset parameters
Yes: Reset parameters (see table)

Factory Settings:

Group	Parameter	Default	Calibration
1 (Scale Parameters)	Single/Dual/Triple Range	Single Range	
	Capacity	3000	
	Interval	1	
	Unit	kg	
2 (Calibration)	Geo Value	20	
	Zero (mV/V)	0.00000	
	Load (mV/V)	2.00000	
5 (Adaptation)	Motion Window	0.5D	
	Motion Counter	20	
	Filter Size	11	
	Auto Zero Range	0.5D	
	Pushbutton Zero (+)	2%	
	Pushbutton Zero (–)	2%	
	Power Up Zero	OFF	
	Overload	9D	

10.10 Calculate Span

When the rated output signal of a scale's loadcell(s) is known, calibration can be made without test weights. This information is available, for instance, for loadcell types D1, C2 and C3 OIML, for which test reports are issued by the manufacturer stating the rated output in mV/V.

A prerequisite is that the unloaded scale can be calibrated at zero, which is usually the case.

`8 Calculate Span`	Calibration without test weights
`Calibrate Zero?  Y`	Scale Zero Calibration. Unload the scale and confirm to start the calibration.
Info	Scrolling Yes: Calibrate Zero No: Continue in step '`Zero(mV/V)`'
↵	Zero Calibration
`Calibrating...`	Measuring Zero signal. Message for approx. 6 sec
`Zero:  9999999`	Displays actual weight with tenfold resolution (for verification).
`Zero(mV/V):  9999999`	Display of rated signal (e.g. 0.23785)
Clr	Clear value and enter new one
`LC-Cap.(kg)  999999`	Enter nominal capacity of one loadcell
`No.Of LCs  9`	Enter number of connected loadcells (max. 8)
`mV/V Of LC 1  .99999`	Enter rated signal of first loadcell. Continue with next loadcell, after the last loadcell continue in the next step.
`Load (mV/V)  9.99999`	Display of the calculated rated signal at full load.
↵	Return to step '`8 Calculate Span`'

Note: The captured values for Zero and Load are automatically entered as calibration values and can be verified in group '2 Calibration'.

10.11 W&M Info

In this group the setting of parameters can be checked that are relevant for W&M aproved scales. Any deviation is indicated.

9 W&M Info

Check parameters for W&M approved scales (permissible values in brackets):

Motion Window	(0.5d)
Motion Counter	(≥7)
Autozero Range	(0.5d)
Pushbutton Range	(≤4%)
Overlod	(max. 9d)

If all settings comply with W&M regulations a corresponding message is displayed:

W&M Setup ok

If settings do not comply with W&M regulations a corresponding message is displayed,example:

Error: Overload > 9d

Value for overload blanking is set to a value greater than 9d.

↵ Continue

If setting for Power Up Zero is unequal ±2% or ±10%, only a warning is shown, because depending on the specific application also the setting 'Off' might be acceptable, e.g. for hopper scales.

Warning: PUZero Off

10.12 Factory Calibration

The calibration parameters of the A/D converter are stored in a powerfail safe EEPROM.

During testing and check out of a weighing terminal, the A/D converter is factory calibrated. I.e. correction factors (Gain and Offset) are measured by means of precision simulators and stored to equalize the different amplification values of the individual boards.

When a scale is calibrated, the rated values (mV/V) are measured for Zero (preload) and Load (preload plus weighing range). Due to the factory pre-calibration (and resulting near-identical amplification), these rated values can be transferred from one ADM board to another one, if there is a need to do so, e.g. in the event of a break down to minimize down time. However, it is strongly recommended to check the accuracy of the scale with test weights as soon as possible. Recalibration with certified test weights is mandatory for scales that are subject to Weights & Measures approval.

Entry of rated values is made in Calibration Mode, Group 2, in the steps 'Zero(mV/V)' and 'Load(mV/V)'.

10.13 Geo Values

Examples for Geo Values by Country:

Country	Geo Value
France	20
Finland	24
Belgium	21
Denmark	23
Germany	20
Great Britain	21
Ireland	22
Norway	24
Netherland	21
Austria	19
Switzerland	18
Sweden	24
Spain	15

Table of Geo Values

Northern or southern terrestrial latitude in degrees and minutes	Height above sea level (in meters)										
	0 325	325 650	650 975	975 1300	1300 1625	1625 1950	1950 2275	2275 2600	2600 2925	2925 3250	3250 3575
	Height above sea level (in feet)										
	0 1060	1060 2130	2130 3200	3200 4260	4260 5330	5330 6400	6400 7460	7460 8530	8530 9600	9600 10660	10660 11730
0° 0' - 5° 46'	5	4	4	3	3	2	2	1	1	0	0
5° 46' - 9° 52'	5	5	4	4	3	3	2	2	1	1	0
9° 52' - 12° 44'	6	5	5	4	4	3	3	2	2	1	1
12° 44' - 15° 6'	6	6	5	5	4	4	3	3	2	2	1
15° 6' - 17° 10'	7	6	6	5	5	4	4	3	3	2	2
17° 10' - 19° 2'	7	7	6	6	5	5	4	4	3	3	2
19° 2' - 20° 45'	8	7	7	6	6	5	5	4	4	3	3
20° 45' - 22° 22'	8	8	7	7	6	6	5	5	4	4	3
22° 22' - 23° 54'	9	8	8	7	7	6	6	5	5	4	4
23° 54' - 25° 21'	9	9	8	8	7	7	6	6	5	5	4
25° 21' - 26° 45'	10	9	9	8	8	7	7	6	6	5	5
26° 45' - 28° 6'	10	10	9	9	8	8	7	7	6	6	5
28° 6' - 29° 25'	11	10	10	9	9	8	8	7	7	6	6
29° 25' - 30° 41'	11	11	10	10	9	9	8	8	7	7	6
30° 41' - 31° 56'	12	11	11	10	10	9	9	8	8	7	7
31° 56' - 33° 9'	12	12	11	11	10	10	9	9	8	8	7
33° 9' - 34° 21'	13	12	12	11	11	10	10	9	9	8	8
34° 21' - 35° 31'	13	13	12	12	11	11	10	10	9	9	8
35° 31' - 36° 41'	14	13	13	12	12	11	11	10	10	9	9
36° 41' - 37° 50'	14	14	13	13	12	12	11	11	10	10	9
37° 50' - 38° 58'	15	14	14	13	13	12	12	11	11	10	10
38° 58' - 40° 5'	15	15	14	14	13	13	12	12	11	11	10
40° 5' - 41° 12'	16	15	15	14	14	13	13	12	12	11	11
41° 12' - 42° 19'	16	16	15	15	14	14	13	13	12	12	11
42° 19' - 43° 26'	17	16	16	15	15	14	14	13	13	12	12
43° 26' - 44° 32'	17	17	16	16	15	15	14	14	13	13	12
44° 32' - 45° 38'	18	17	17	16	16	15	15	14	14	13	13
45° 38' - 46° 45'	18	18	17	17	16	16	15	15	14	14	13
46° 45' - 47° 51'	19	18	18	17	17	16	16	15	15	14	14
47° 51' - 48° 58'	19	19	18	18	17	17	16	16	15	15	14
48° 58' - 50° 6'	20	19	19	18	18	17	17	16	16	15	15
50° 6' - 51° 13'	20	20	19	19	18	18	17	17	16	16	15
51° 13' - 52° 22'	21	20	20	19	19	18	18	17	17	16	16
52° 22' - 53° 31'	21	21	20	20	19	19	18	18	17	17	16
53° 31' - 54° 41'	22	21	21	20	20	19	19	18	18	17	17
54° 41' - 55° 52'	22	22	21	21	20	20	19	19	18	18	17
55° 52' - 57° 4'	23	22	22	21	21	20	20	19	19	18	18
57° 4' - 58° 17'	23	23	22	22	21	21	20	20	19	19	18
58° 17' - 59° 32'	24	23	23	22	22	21	21	20	20	19	19
59° 32' - 60° 49'	24	24	23	23	22	22	21	21	20	20	19
60° 49' - 62° 9'	25	24	24	23	23	22	22	21	21	20	20
62° 9' - 63° 30'	25	25	24	24	23	23	22	22	21	21	20
63° 30' - 64° 55'	26	25	25	24	24	23	23	22	22	21	21
64° 55' - 66° 24'	26	26	25	25	24	24	23	23	22	22	21
66° 24' - 67° 57'	27	26	26	25	25	24	24	23	23	22	22
67° 57' - 69° 35'	27	27	26	26	25	25	24	24	23	23	22
69° 35' - 71° 21'	28	27	27	26	26	25	25	24	24	23	23
71° 21' - 73° 16'	28	28	27	27	26	26	25	25	24	24	23
73° 16' - 75° 24'	29	28	28	27	27	26	26	25	25	24	24
75° 24' - 77° 52'	29	29	28	28	27	27	26	26	25	25	24
77° 52' - 80° 56'	30	29	29	28	28	27	27	26	26	25	25
80° 56' - 85° 45'	30	30	29	29	28	28	27	27	26	26	25
85° 45' - 90° 0'	31	30	30	29	29	28	28	27	27	26	26

11 Interface Configuration

In the group 'Interfaces' of the Service Mode, settings are entered for transmission speed, format and protocol of the serial interface. Interface COM1 is intended for the connection of a PC, printer or remote display.

`Service: Interface`		Configure interfaces COM1: PC or printer If alternatively a remote display is to be connected, it must be enabled in group 'General'.
`Com1: 9600 Baud`	**Info**	Select baud rate for serial interface #1: 300, 600, 1200, 2400, 4800, 9600, 19200
	↑	Return to step '`Service: Interface`'
`Com1: 8 Databits`	**Info**	Select data format for serial interface #1: 7 data bits, 8 data bits. Always 1 stop bit is transmitted.
`Com1: No Parity`	**Info**	Select parity for interface #1: No Parity Even Parity Odd Parity
`Com1: No Control`	**Info**	Select hardware handshake for interface #1: XOn/XOff RTS/CTS Halfduplex (for RS485 connections) Multidrop (for RS485 Multidrop connection) No Control

These settings apply only to PC connection:

`Com1: XOR All Char`	**Info**	Select method to calculate checksum: XOR All Char = Exclusive-Or over all characters XOR No Start = Exclusive-Or without start char. XOR No End = Exclusive-Or without end char. XOR OnlyData = Exclusive-Or only over data CPL All Char = Compl. of Twos over all char. CPL No Start = Compl. of Twos without start char. CPL No End = Compl. of Twos without end char. CPL OnlyData = Compl. of Twos only over data No Checksum = no checksum in data string
`Start Char 999`		Enter start character as decimal value, (e.g. 2 = STX)
`End Char 999`		Enter end character as decimal value, (e.g. 3 = ETX)

For the communication with the PC the ACK/NAK protocol is used. For a description of this protocol refer to chapter 'Data Transmission'.

These settings apply only to printer connection:

Com2: Tab = ESC/P	**Info** Select method to output tab function on printer: Tab = ESC/P Tab function as per ESC/P® protocol Tab = Spaces Tab function by sending space characters
S1 On _	Control sequence for print attribute S1 On; Enter ASCII code for control sequence, separate subsequent codes (4 max.) by hyphens, (example: 27–69–48)
S1 Off _	Control sequence for print attribute S1 Off
S2 On _	Control sequence for print attribute S2 On
S2 Off _	Control sequence for print attribute S2 Off
Formfeed Char 999	Enter control character to terminate block 3; examples: formfeed = 012 no output = 000

The parameter 'Formfeed Char' takes effect only for printing in block 3 (totals). Formfeed characters are output in the individual operating modes as follows:

	BASIC / CHECK / FILL 1 / FILL 2
Block 1	—
Block 2	—
Block 3	as specified

Please note: By specifying a special control character the assignment shown above can be changed as follows:

Control character 'Formfeed Char 127'

The attribute 'S 2 off' is output to terminate printing of *each* block.

Control character 'Formfeed Char 126'

The attribute 'S 2 off' is output *only* to terminate printing of block 3. For the other blocks (1 and 2) no control character is sent.

Example: paper handling for model TMU-295 printer; for this purpose the print attributes S1 and S2 must be entered as follows:

Print attribute	ASCII sequence	Function
S1 On	27—99—52	no printing without paper
S1 Off	—	
S2 On	—	
S2 Off	27—113	release paper

I.e. when control character 127 is specified, the ticket can be removed from the printer after the printing of each block (and must be inserted and / or positioned for every new printout), while control character 126 determines that the paper is only released after printout of block 3 is complete. The print attribute 'S1 On' must be assigned to the first field of a block to activate the paper sensor.

12 Configuration Of Data Entry And Print Format

With the print format generator up to 32 print fields in up to 3 blocks can be defined and placed freely on a printout. By assigning appropriate attributes to the individual fields, also an operating sequence consisting of header, cyclic part and totals, with entries and calculations can be generated. The predefined basic application routines (operating modes), except 'Online' (see group 'General'), can be supplemented in this way. The position of a field on the printout is defined by specifying its line and column number. With the PC program IT3000 *Configurator*, definition of printouts and configuration of sequences are possible in a very convenient way, but all functions are also accessible via keyboard and display of the weighing terminal (except for special characters not available on the terminal's keyboard).

12.1 Configuration Of Fields

`Service: Format`		Configure print and input fields
`Field-No. 1`		Start with field 1
	↑	Return to step '`Format`'
	Clr	Clear displayed field-No. and enter new one
`F01: Block 1`	**Info**	Select partial sequence for the field: Block 1 = header Block 2 = cyclic part Block 3 = totals Not Used = field is not used On entry 'Not Used' continue with next field
`F01: Line No. 999`		Enter line-No. of print field
	Clr	Clear displayed line-No. and enter new one
`F01: Column No. 999`		Enter column-No. of print field
	Clr	Clear displayed column-No. and enter new one

```
F01:  No Attribute
```

Info Select print attribute for the print field:

Bold
Underlined
Expanded
Condensed
Italic
Special 1 = attribute as defined with S1 On/Off
Special 2 = attribute as defined with S2 On/Off
No Attribute

Note: The print attributes Bold to Italic are output in compliance with the ESC/P® standard and must be supported by the connected printer. The attributes Special 1 and 2 can be defined as control sequence with a maximum of 4 successive ASCII codes in group 'Interface'.

```
F01:  Fetch
```

Info Select how the field is to be generated:

Fetch = system variable
Input = operator entry
Calculate = arithmetical operation
Text = predefined or entered text

If field is generated with 'Fetch':

```
F01: Fetch
```

Info Use system variable as field:

Date
Time
Consec.-No.1 *)
Consec.-No.2 *)
Gross
Tare
Net
Total Gross
Total Tare
Total Net
Unit unit sign of calibration (kg, t)
Target target weight for filling (FILL)

*) The consecutice-No. 2 is increased by 1 with every weighing in the cyclic part (block 2). If a totals sequence (block 3) is defined, consecutive-No. 2 is reset to 1 again after this block has been carried out. Consecutive-No. 1 (5 digits) is increased by 1 only after carrying out block 3 (if that is defined).

If field is generated with 'Input':

```
F01: Input
```

```
F01: Datum
```

Info Select prompt from text table (10 entries):

Date	Time	Ticket-No.
Consec.-No.	Gross	Tare
Net	Total	<Space>

F1 Furthermore up to 10 entries may be added to the text table (lenght max. 20 characters each, max. 100 characters in total). Use F1-key to call up entry. This text table is used for both, operator prompts for entries and print fields.

F01: String Type	**Info**	Select data type of entry: String = alphanumeric text Number = numeric value only
F01: No.Of Char. 99		Specify length of entry (16 characters max.)

Only for type 'Number':

F01: Fix Dec.Pt.=0	**Info**	Select position of decimal separator: 0 - 4 entry with 0 - 4 trailing decimals *)
F01: Sto.A.Print	**Info**	Select whether entry is to be stored -or not- after printout has been completed: Sto.After Print = store after print for the next cycle Del.After Print = delete after print

*) If an entry contains a decimal separator, it is counted as one digit that must be considered when the length is specified. Example: a numeric entry with 6 digits and two trailing decimals is represented internally and transmitted as '999.99'.

If field is generated with 'Calculate':

F01: Calculate		Generate field through arthmetical operation on two operands
F01 1st Operand 99		Enter field-No. of first operand: 1 - 32 field 1 - 32 33 factor 1 (as entered in group 34 factor 2 'General')
	Clr	Clear displayed field-No. and enter new one
F01: 2nd Operand 99		Enter field-No. of second operand: 1 - 32 field 1 - 32 33 factor 1 (as entered in group 34 factor 2 'General')
	Clr	Clear displayed field-No. and enter new one
F01: Add		Select how the two operands are to be linked: Add = add operand 2 to operand 1 Sub = subtract operand 2 from operand 1 Mul = multiply operand 1 with operand 2 Div = divide operand 1 by operand 2 % = calculate [operand 2] percent of [operand 1]
F01: No.Of Char 99		Enter number of digits for the result; Valid entries: 1 - 16
F01: Fix Dec.Pt.=9	**Info**	Select position of decimal separator: 0 - 4 format result with 0 - 4 trailing decimals

If field is generated with 'Text':

F01: Text	**Info**	Select text that is to be printed from table (10 entries): Date / Time / Ticket-No. Consec.-No. / Gross / Tare Net / Total / Parts Piece Wgt(g)
F01:		After the last default text additional texts can be entered or edited. Up to 10 texts may be added to the table (length max. 20 characters each, max. 100 characters in total). This function is called up at the end of the table with the F1-key. The text table is used for both, operator prompts for entries and print fields.
	F1	Press F1-key to enter / edit additional texts
Order-No.	↵	Specify additional text and confirm with ↵-key. Press Clr-key to delete individual characters or the complete entry.
F01: Order-No.	↵	Press ↵-key to confirm or Info-key to proceed with entries.

Note: Press F1-key in this step to edit this text.

For examples of print formats, please refer to chapter 'Configuration Examples'.

13 Entry Of Parameters

In this group parameters are entered to select the language for prompts and 'Text' fields, format of the date, operating mode, control of outputs (analog and digital) and to specify 2 factors that can be used in arithmetical operations.

Service: General		Enter parameters
Language: English	**Info**	Select language for prompts and print fields 'Text': English German French Dutch Polish Italian Spanish Danish Swedish Norwegian Greek

Date: DD.MM.YY	**Info**	Select format of date: DD.MM.YY MM.DD.YY YY.MM.DD DD-MM-YY MM-DD-YY YY-MM-DD DD/MM/YY MM/DD/YY YY/MM/DD
Application: Basic	**Info**	Select operating mode: Basic = data logging / capturing Fill 1 = fill mode 1 Fill 2 = fill mode 2 Check = checkweighing Online = remote control from PC Flow = display of flow rate RemoteD = remote control function Only for optional custom software (IT3000Ex P): Online P = Remote control via Profibus DP

Only for operating mode 'FLOW:

Resolution: 0.1kg/h	**Info**	Resolution of flow rate: 0.1kg/h, 1kg/h, 0.01t/h, 0.1t/h, 1t/h
Flow Interval(s) 1.0		Interval for update of flow rate display

Taremode:Gross/Net	**Info**	Select tare mode: Gross/Net = press tare key to toggle gross / net display and back; Auto Clear = on return to the zero range the tare weight is automatically cleared; Net = 0 = every time the tare key is pressed the scale is autotared

Only if Net = 0

Clear Tare: Auto	Auto = on return to the zero range the tare weight is automatically cleared and the display returns to gross mode Manual = tare must be cleared manually with the Tare-key

Operating mode 'BASIC' selected:

Auto Print? 0	**Info** **or** **0 / 1**	N(o) Automatic print release disabled Y(es) Automatic print release after scale is loaded and a settled weight obtained. **Note:** A prerequesite for this function is that a value is entered for setpoint 1, greater zero and smaller than actual weight.

With this function a print is released automatically after the weight threshold entered with setpoint 1 is exceeded and a settled weight is detected. The next print cycle is started when first the weight fallls below the threshold and then exceeds it again.

Operating mode 'BASIC' selected:

Out0: Less S1	**Info**	Select control of output Out0:
		G < S1 = set if gross weight < S1
		G > S1 = set if gross weight > S1
		N < S1 = set if net weight < S1
		N > S1 = set if net weight > S1
		N in S1-S2 = set if net weight > S1 & < S2
		N Out S1-S2 = set if net weight < S1 or > S2
Out1: Less S2	**Info**	Select control of output Out1:
		G < S2 = set if gross weight < S2
		G > S2 = set if gross weight > S2
		N < S2 = set if net weight < S2
		N > S2 = set if net weight > S2
		N in S1 S2 = set if net weight > S1 & < S2
		N Out S1 S2 = set if net weight < S1 or > S2
		Prt On/Off = control output for printer *)

Note: The free assignment of functions to the outputs Out0 and Out1 applies only to the operating mode 'BASIC'. In all other operating modes this assignment is part of the application program.

*) In the operating mode 'BASIC', the output Out1 can be used to switch on a printer only when it is actually in use (power save mode). If this function is enabled, the output to control the printer is on for 15 sec after power up, and for 1 sec before, during and 15 sec after printing.

Operating mode 'ONLINE' selected:

Taring: Locked	**Info**	If requested, the tare functions can be enabled in the operating mode 'ONLINE' (it is normally disabled in this mode):
		Locked Tare function disabled
		Free Tare function enabled

Operating mode 'ONLINE P' selected:

Slave Address 999	Enter 3-digit slave address for Profibus communication.
Terminal-No. 999	Enter terminal-No. for data transmission
Value F33_99999.9999	Optional entry of a constant (field 33), that can be used as factor 1 in calculations (e.g. kg / lb conversion)
Value F34_99999.9999	Optional entry of a constant (field 34), that can be used as factor 2 in calculations

All operating modes except 'ONLINE P':

`Cont.Output: Off`

Info Setting for continuous output:

Off	=	continuous output disabled
Com1 Sys	=	COM1 with SysTec format
Com1 Tol	=	COM1 with TOLEDO® format
Com1 TSM	=	COM1 with TOLEDO® TSM format
Com1 Fli	=	COM1 with Flintec format
Com1 Spec	=	COM1 with customized format

For a description of the data strings refer to chapter 'Data Transmission'.

`Digital I/O: Intern`

Select mode for digital I/Os:

Intern: Internal I/O on CPU3000Exi
Extern: External REL485 / TRIO485 module, connected via separating module TS10mAEx to COM1

`MAI: No`

Select mode for analog output:

No: No analog output
G 0-20mA: MAI; gross 0-20mA (0-10V)
G 4-20mA: MAI; gross 4-20mA (2-10V)
N 0-20mA: MAI; net 0-20mA (0-10V)
N 4-20mA: MAI; net 4-20mA (2-10V)

External MAI module connected via separating module TS10mAEx to COM1; (DAE on MAI position X1).

`Light Off (Min) 999`

If keyboard is not in use, the backlighting is switched off after this time has elapsed (powersave for battery operated terminals). Press any key to switch back-lighting on again.

Enter 0 to disable this function.

`Power Off (Min) 999`

If keyboard is not in use, the complete terminal is switched off after this time has elapsed (powersave for battery operated terminals). Press Power On-key to switch on again.

Enter 0 to disable this function.

`LowBat Off (Min) 999`

If battery low is detected and the corresponding symbol displayed, the complete terminal is switched off after this time has elapsed (powersave for battery operated terminals). Only after charging the battery and pressing the Power On-key can the terminal be switched on again.

Enter 0 to disable this function.

`ServicePassword _`

Entry of a 4-digit Service Password

Note: After entry and storage of a self-defined Service Password, the factory set default password is no longer valid! The Service Mode can then only be accessed via the new password!

Assignment of inputs and outputs depending on chosen operating mode:

Operating Mode	Input E0	Input E1 [1])	Output A0	Output A1
BASIC	Signal Start / Enter	Signal Taring	Function depends on Service Mode settings	
FILL 1/2	Signal Start / Stop	Signal Interrupt	Feeder fast speed	Feeder slow speed
CHECK	Signal Start / Enter	Signal Taring	Result of check: 'Weight ok'	Result of check: 'Out-of-tolerance'

[1]) If an incline sensor is connected to input IN1 (mobile weighing), taring via this input is no longer possible.

14 Backup

The settings in Service Mode and calibration can be transferred to and saved on a PC. This provides the convenient option to archive configurations for different applications and to download them into new terminals.

When Backup or Restore is selected, interface parameters are automatically set for the communication with the PC program IT3000 *Configurator*.

`Service: Backup`	Transfer data to PC, terminal must be connected to PC with the IT3000 *Configurator* program installed and started.
`PC Ready To Save?`	Confirmation, are you sure?

PC not ready:

`PC Not Ready !`	Error message PC not ready
`Saving...`	Display during data transmission

15 Restore

This function is used to download a stored or modified configuration into the weighing terminal.

`Service: Restore`	Download data into weighing terminal, terminal must be connected to PC with the IT3000 *Configurator* program installed and started.
`IT Ready To Restore`	
	F8 Abort transmission

Note: After a configuration has been downloaded into the terminal that includes a totals section (block 3), for the initialization of the program this block must be carried out by pressing the Total-key, before normal weighing operation can be started.

Data transmission from PC not successful:

`Not Successful!`	Error message, transmission was not successful, rectify the problem and try again.

16 Hardware Test

W A R N I N G
Exercise utmost care when making checks, tests and adjustments that can actuate movable parts such as feeding devices, gates, flaps, conveyors, etc. Make absolutely sure that nobody is within reach of movable parts. Failure to observe this precaution could result in bodily injury!

`Service: Test`	Select hardware test
`DIn: 10  DOut: 01`	Display state of the two digital inputs and outputs (1 = input/output on). With the keys 0 and 1 of the numeric keypad, the outputs 0 (key 0) and 1 (key 1) can be set / reset. The picture on the left shows the state: input 0 = Off input 1 = On output 0 = On output 1 = Off
Info	Press Info-key to select test

Only if 'MAI' is not chosen in group 'General':

`Com1:  ok`	Test serial interface 10mA; jump lead from terminal 1 to 4 required

`AIn (mV/V)  1.234`	Display of analog input signal for checks and plausibility test
↑	Return to '`Service: Test`'

Only if 'MAI' is chosen in group 'General':

`Zero-ADJ.MAI  0`	Calibrate analog signal to 0/2V or 0/4mA: 1) Unload scale. 2) Connect multimeter and check value 0/2V or 0/4mA. 3) Press '1'-key to stepwise increase analog signal (the measured value rises). Press '0'-key to stepwise decrease analog signal (the measured value falls).
`Gain-ADJ.MAI  3000`	Calibrate analog signal to 10V or 20mA: 1) Apply max. load. 2) Connect multimeter and check value 10V or 20mA. 3) Press '1'-key to stepwise increase analog signal (the measured value rises). Press '0'-key to stepwise decrease analog signal (the measured value falls).

17 Reset

With this function values and parameters can be restored to factory settings. Parameters for calibration remain unchanged.

Service: Reset	Reset parameters

Reset? N	**Info** N(o): Do not reset parameters Y(es): Reset parameters to default values (see table)

Date:	DD.MM.YY
Language:	German
Operating mode:	BASIC
Printer:	Off
Data transmission:	Off
COM1:	9600 Baud, 8 Bits, no parity
Handshake:	No Control
Checksum:	XOR checksum excl. start character, incl. end character
Start character:	2 = STX
End character:	3 = ETX
Tab function of printer:	TAB = ESC/P®
Print layout:	Simple weighing

18 Operating Modes

18.1 Weighing Functions

The initial step for all operating modes is the display of the weight. In this step the elementary scale functions are accessible.

W1 25.60 kg		Display of gross weight For multiple-range scales the valid range (e.g. 1.2) is shown on the left hand side, for scales with only one range always W1 is indicated.
	F8	Call up Supervisor Mode

Show weight with tenfold resolution

W1 25.60 kg	**F0**	Switch weight display to tenfold resolution
X10 25.604 kg		Weight display with tenfold resolution Display is switched back after 5 sec

Set gross weight to zero

W1 0.02 kg	→0←	Set gross weight to zero (only within selected range for pushbutton zero)
W1 Ø 0.00 kg		Gross weight set to zero

Print and totalize

W1 25.60 kg	↵	Release printing and totalizing at the end of a weighing cycle
P1 25.60 kg		P1 appears on the display instead of W1 during printout and data transmission and also while waiting on a settled weight after releasing a printout.

18.2 Tare Functions

In the Service Mode, Group 'General' one out of 3 different tare modes can be chosen.

18.2.1 Set / Clear Tare

Setting 'Taremode: Gross/Net': With each actuation of the tare key the display is switched from gross to net and back. This is the usual tare function which is appropriate for most applications.

W1 25.60 kg	→T←	Autotare: Press Tare-key to tare scale.
W1 0 kg NET	→T←	Clear tare, return to display of gross weight.
W1 25.60 kg		

18.2.2 Autoclear Tare

The loaded scale can be tared only once, and the net display is automatically switched back to gross when the scale returns to the zero range (setting 'Taremode:Auto Clear').

This function must be activated by the operator by pressing the F1 key in the basic step of the sequence, it is useful for serial weighings with changing tare weight.

W1 25.60 kg		Display of gross weight
	F1	
Auto Clear Tare On		Display for approx. 1 sec, autoclear is now activated.

The autoclear function can be disabled by pressing the F1 key again, then the scale can only be tared once and the tare weight remains stored until F1 is pressed to again enable autoclear. This function is useful for serial weighings with identical tare weight. After power up autoclear is disabled.

W1 25.60 kg		Display of gross weight
	F1	
Auto Clear Tare Off		Display for approx. 1 sec, autoclear is now deactivated.

18.2.3 Repetitive Tare

With each actuation of the tare key the scale is tared anew. The net display is automatically switched back to gross when the scale returns to the zero range (setting 'Taremode: Net = 0').

18.2.4 Manual Tare

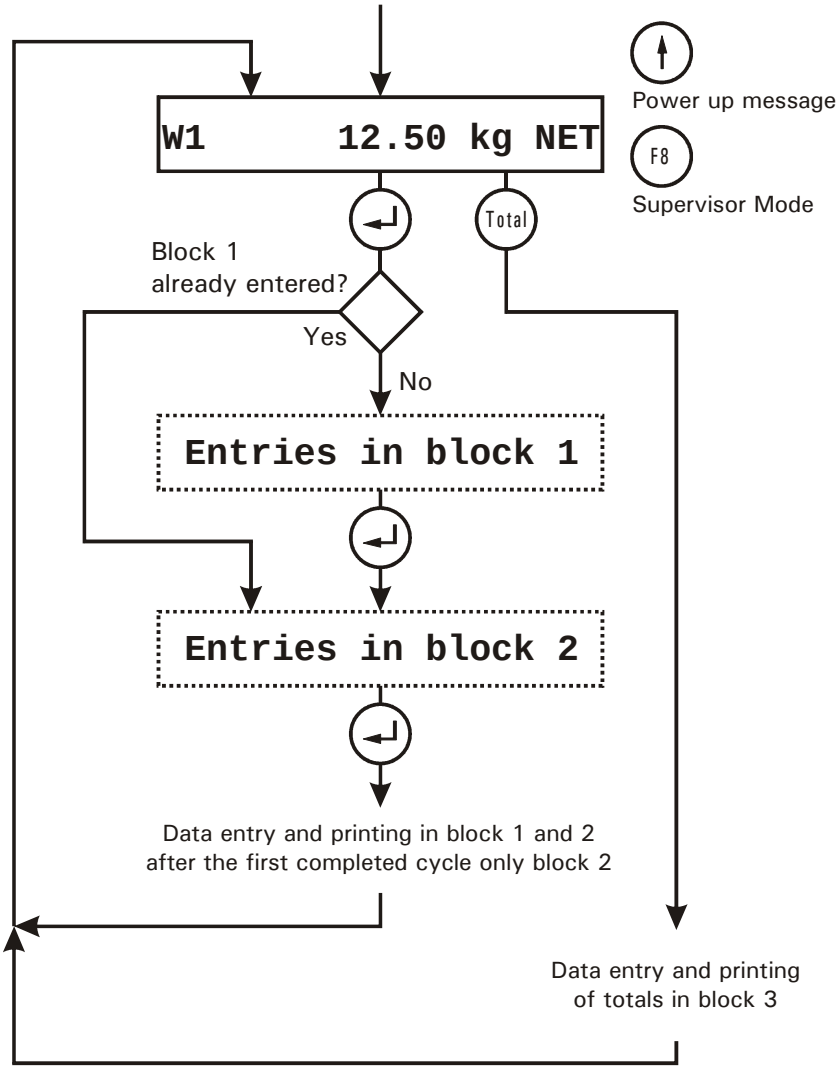
W1 25.60 kg	**0...9**	Manual tare: After pressing a numeric key, entry of manual tare is enabled,
Tare Input __1.000	↵	after entry of a complete tare weight and pressing the Enter-key the net weight is displayed.

18.2.5 Show Tare Weight

W1 15.40 kg NET	**Info**	When scale is tared, press Info-key to show tare weight.
25.60 kg TAR		Tare weight when scale was autotared
or		
10.20 kg PT		Tare weight when scale was manually tared
	Info	Return to display of net weight
W1 15.40 kg NET		

18.3 Operating Mode 'BASIC'

Principal program structure



After the start of the sequence, the operator is prompted for the entry of the IDs defined in block 1 (header section), e.g. customer-No. for a delivery note, followed by block 2 (cyclic part) with the entry of the pertaining IDs, e.g. article-No. Then the weight is captured and data are printed as defined in block 1 and 2. After block 1 has been carried out once, it is skipped for all following cycles. The cyclic part can be executed as many times as required. After the last weighing cycle in block 2 (with printout) and pressing the Total-key the program proceeds to the sequence for block 3 (totals section) to print, for instance, a line with the totals of all transactions. After that the program returns to the entries in block 1.

This structure provides many options for the configuration of operating sequences with a varying level of complexity. A simple data logging sequence, for instance, can be configured with block 2 only, while omitting of the other two blocks.

Independently of data entry and printing the two setpoints for the outputs A0 and A1 are monitored in the background. The two inputs are active in parallel to the keyboard functions:

rising edge E0 ↵

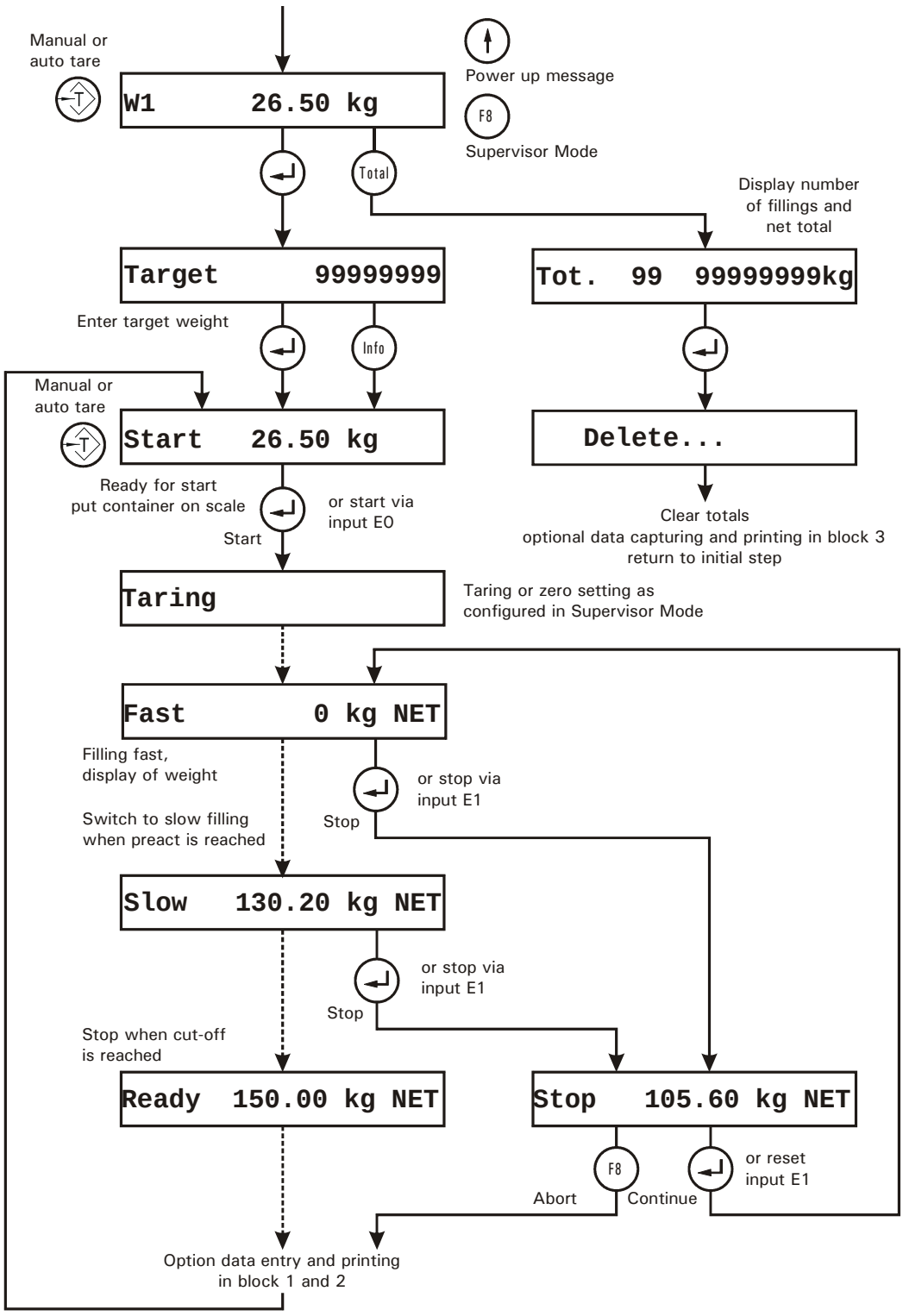
rising edge E1 T

See chapter 'Configuration Examples' for details on how to configure print formats and operating sequences.

Automatic printing after loading the scale and reaching a settled weight can be enabled in the Service Mode, group 'General'.

18.4 Operating Mode 'FILL 1 / 2'

Principal program structure



The operating modes 'FILL 1 / 2' can be used for a simple two-speed filling operation with fast and slow filling. The target value is entered as input step in the sequence. The two setpoints S1 and S2 are used for the calculation of the fast / slow setpoint (S1) and the preact for the in-flight compensation (S2). These values are subtracted from the target value.

The difference between the Operating modes 'FILL 1' and 'FILL 2' is the control of the feeding device:

Feeding	Fill 1	Fill 2
'Fast' up to fast/slow switching point (S1)	Output A0 'On' (fast) Output A1 'Off' (slow)	Output A0 'On' (fast) Output A1 'On' (slow)
'Slow' up to cutoff point (S2)	Output A0 'Off' (fast) Output A1 'On' (slow)	
'Dribble'	Output A0 'Off' (fast) Output A1 'Off' (slow)	

Zero setting / taring

Several taring / zero setting options can be selected. The choice is made in the Supervisor mode in a step that appears only if operating mode 'FILL 1 / 2' is enabled. Options:

- scale is autotared prior to every filling cycle (net filling);
- scale is set to gross zero prior to every filling cycle (only within zero setting range = Push Button Zero), filling is started only if zero setting could be carried out successfully;
- filling is started without auto taring or zero setting (gross filling); manual tare is possible in the start step to enter the tare of not completely emptied or partially filled containers (e.g. gas bottles). For series weighings this tare weight remains stored until it is cleared or changed. Please note: the use of manual tare is not appropriate for the other two filling modes.

Cut-off points

Weight and target are compared as absolute (unsigned) values, thus it is possible to fill empty containers or to withdraw material from filled -or partially filled- ones.

Example: target weight 100.0 kg
fast / slow switching point at 90.0 kg (preact fast = 10 kg)
cut-off slow at 98.8 kg (preact slow = 1.2 kg)
S1 = 10 kg; S2 = 1.2kg (entry in Supervisor Mode)
filling fast from 0 kg to 90.0 kg;
filling slow after switching to slow speed, until 98.8 kg is reached.

The value for S1 must be greater than that of S2. If single-speed filling is to be configured, identical values are entered for S1 and S2, the filling cycle is then controlled only via output A0.

Exchange of signals

The parallel inputs E0 and E1 can be used as external Start / Interrupt signals.

FILL 1: After the start of a filling cycle with the Enter-key or the input signal E0, the scale is autotared (depending on the setting FMode in the Supervisor Mode) and filling fast is released via the output A0. When the fast/slow switching point is reached, filling fast is switched off and filling slow is started (output A1).

FILL 2: After the start of a filling cycle with the Enter-key or the input signal E0, the scale is autotared (depending on the setting FMode in the Supervisor Mode) and filling fast is released via the outputs A0 and A1. When the fast/slow switching point is reached, A0 switched off and filling slow is continued with output A1.

The running filling cycle can be interrupted at any time by pressing the Enter-Key or setting the input E1. The cycle can be continued by pressing the Enter-key again or resetting the input E1, respectively.

After reaching the cut-off point, filling is stopped completely and subsequently -if applicable- the operator is prompted for the inputs in block 1 and 2 (block 1 only for the first cycle). When printout and data transmission is completed, the terminal is ready for the next filling cycle.

For data capturing and recording, the net weight and the batch counter (consecutive-No. 2) can be supplemented with inputs in the header section (block 1) and the cyclic section (block 2). A printout of totals can be configured in the totals section (block 3). After pressing the Total-key the current status of batch counter and net total is displayed for verification. If the Enter-key is pressed now, block 3 is printed and the totals are reset. If instead display of totals is exited with the Up-key, totals are retained and more filling cycles can be carried out.

Data entry and recording

For data capturing and recording, the net weight and the batch counter (consecutive-No. 2) can be supplemented with inputs in the header section (block 1) and the cyclic section (block 2).

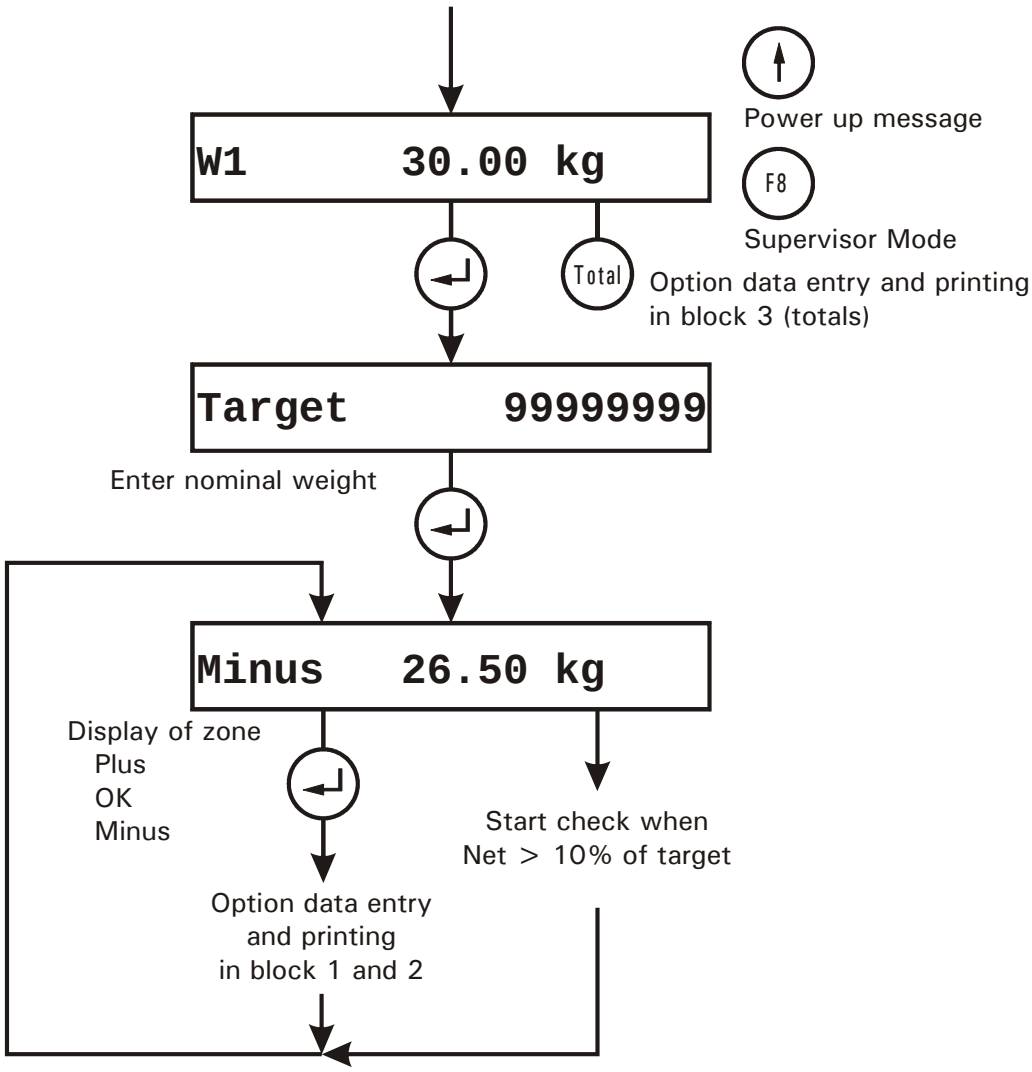
A printout of totals can be configured in the totals section (block 3). After pressing the Total-key the current status of batch counter and net total is displayed for verification. If the Enter-key is pressed now, block 3 is printed and the totals are reset. If instead display of totals is exited with the Up-key, totals are retained and more filling cycles can be carried out.

Overview: setpoint setting in operating mode 'FILL 1 / 2':

	Example		Target: 100kg
Setting	S1 (Grob)	S2 (Fein)	Filling
S1 greater S2	20	5	• Up to 80kg fast • Up to 95kg slow • Dribble (in-flight) up to 100kg
S2 equal 0	20	0	• Up to 80kg fast • Up to 100kg slow (dribble is ignored)
S2 greater or equal S1	20	≥ 20	• Up to 80kg fast • Dribble (in-flight) up to 100kg (slow is disabled, filling is only controlled via output A0)

18.5 Operating Mode 'CHECK'

Principal program structure



In the operating mode 'CHECK' the weighing terminal operates as a plus/minus check scale, classifying the weight of the test object in three zones (plus / ok / minus). The minus threshold is calculated as target value minus value entered for S1, while the plus threshold is target value plus S2. The output A0 indicates 'Weight ok', whereas A1 is used for the status 'Out of tolerance'. For data capturing and recording, the header section (block 1) and the cyclic section (block 2) can be configured. A printout of totals can be specified in the totals section (block 3).

In the appropriate steps of the sequence, the two inputs work in parallel to the keys:

rising edge E0	↵	Enter
rising edge E1	→T	Taring

If one of the outputs A0 or A1 (or both) is wired on the input E0, printing is automatically released after capturing the weight and classifying the test object.

A checkweighing cycle is started when the scale is loaded with more than 10% of target weight and no-motion is detected. Thereafter the output signal corresponding to the result of the check is set, and it remains on until the weight falls below the threshold of 10% of target, e.g. the test object is removed from the scale. Then the output signal is reset and a new cycle can be started.

18.6 Operating Mode 'FLOW'

In the operating mode 'FLOW' the weighing terminal works as a flow meter. The resolution of the flow rate and the update interval of the display are entered in the group 'General' of the Service Mode.

The display of the flow rate is activated by pressing the F1-key.

W1 605 kg	**F1**	Basic step
W1 1 kg/min		Display of flow rate

19 Supervisor Mode

In the Supervisor Mode parameters are entered during normal operation. From the first step of the application program (weight display) the Supervisor Mode can be called up with the F8-key.

Note: If the weighing terminal was powered down for a longer period of time, it might be necessary to again enter date and time.

W1 15.00kg NET		Example for weight display in initial step
	F8	Call up entries (Supervisor Mode)

Password specified for Supervisor Mode:

Password ????	Enter password for Supervisor Mode

Date 04.09.01	Enter date, format as specified in Service Mode
Time 17:15	Enter time

All operating modes except 'ONLINE':

Ticket-No. 99999	Enter / change ticket-No. (consec.-No. 1) for printout
Consec.-No. 9999	Enter / change consecutive-No. 2 for printout

1st Setpoint _____	Enter setpoint S1 (function depending on chosen operating mode): • BASIC: Threshold S1, either for parallel output or automatic printing after scale has settled • CHECK: Minus tolerance • FILL1/2: Cut-off filling fast
2nd Setpoint _____	Enter setpoint S2 (function depending on chosen operating mode): • BASIC: Threshold S2 for parallel output • CHECK: Plus tolerance • FILL1/2: Cut-off filling slow

Only if continuous output disabled and not in operating mode ONLINE:

With Printer? N		Enable / disable printer	
	Info	N	Without printer
	or 0 / 1	Y	With printer

Operating modes 'BASIC', FILL' and 'CHECK' only:

Data Transm.? N		Enable / disable data transmission	
	Info	N	Without data transmission
	or 0 / 1	Y	With data transmission

Note: Since IT3000Ex features one serial interface only, either a printer **or** a PC can be connected.

Operating mode 'FILL 1 / 2' selected:

FMode(T=0/Z=1/F=2) 9		Select tare / zero setting function that is to be carried out prior to a filling cycle	
	0	Taring:	Scale is tared prior to every cycle
	1	Zero setting:	Scale is set to zero prior to every cycle (only within specified zero setting range, filling is only started if zero setting could be carried out successfully)
	2	Finish filling:	Filling is started without taring or zero setting (e.g. to finish a partial filling)

Password 9999	Enter password for access to Supervisor Mode, if no password is specified, Supervisor Mode can be called up without password check.

Return to basic step.

20 Operating Mode 'ONLINE'

In the operating mode 'ONLINE' the weighing terminal is remotely controlled from a PC via serial interface. If operator interaction is required, the PC must send the corresponding prompts. Weighing functions from the keyboard -except for zero setting- are disabled. Additionally, the Tare-key can be enabled in Service Mode. The marker 'O1' on the left side of the display indicates that 'ONLINE' mode is active.

O1 30.00 kg NET	Example for weight indication in ONLINE mode
F8	Exit ONLINE mode
→0←	Set gross weight to zero
W1 30.00 kg NET	Terminal in simple weighing mode, ONLINE mode disabled
↵, ↑	Return to ONLINE mode

20.1 Structure Of Data Strings

Each data string from the host computer to the weighing terminal at least consists of a 2-character command. Some strings may contain additional parameters and/or data. The maximum length of a string is 250 characters.

Data string PC → weighing terminal:

<	*Command*	*Parameter*	*Data*	>

Data string weighing terminal → PC:

<	*Error code*	*Data*	>	CR	LF

For a list of error codes refer to section 'Key And Error Codes'.

20.2 Overview On Commands

Command	Description	Example
RN	Read Weight (no motion)	**RN1**
RM	Read Weight (in motion)	**RM1**
TA	Automatic Tare	**TA1**
TM	Manual Tare	**TM000056.71**
TC	Clear Tare	**TC1**
SS	Select Scale *)	**SS1**
SZ	Set Scale To Zero	**SZ1**
DN	Display Text Without Confirmation	**DNWait...**
DA	Display Text With Acknowledgement	**DADrum on scale?**
DI	Display Text With Data Input	**DIArticle-No.____123**
DS	Display Text for approx. 3 sec	**DSReady...**
RK	Read key code of last-pressed key	**RK**
SP	Set setpoints	**SP2100.5**
GI	Read Digital Inputs	**GI**
OS	Set Digital Output	**OS01**
OC	Clear Outputs	**OC01**

*) Select Scale is a dummy command and only implemented because of compatibility with existing PC prorams.

20.3 Read Weights

Please note: The weighing terminal supports one scale base only. Thus, the scale-No. included in the command is ignored. The scale-No. returned in the data string is always '1'.

RN **Read Weight (no motion)**

The RN command reads a settled weight.

If the scale is settled, the gross, net and tare weights are returned to the host along with current date and time and ID-number. If a settled weight cannot be obtained within 10 seconds, the RN command is aborted and error code <13> is returned instead.

Note: 'Settled' means that consecutive weight readings do not differ more than specified in the scale calibration (motion window).

Command

Field	Byte	Char's	Description	Example
RN	1	2	Command	**RN**
Scale-No.	2	1	Optional (see note about scale-No.)	**1**
	In total:	3		

Response

Field	Byte	Char's	Description	Example
Error code	1	2	00 = no error, see table error codes	**00**
Scale status	3	2	First Byte: 0 = scale settled 1 = scale in motion Second Byte: 0 = gross positive 1 = gross negative	**00**
Date	5	8	Date (formatted as per configuration)	**02.05.05**
Time	13	5	Time (formatted HH:MM)	**14:30**
Ident-No.	18	4	Ident number (non-significant digits are transmitted as space character)	**___1**
Scale-No.	22	1	Always '1' (see note)	**1**
Gross weight	23	8	Formatted as per configuration (non-significant digits are transmitted as space character)	**__430.00**
Tare weight	31	8	Formatted as per configuration (non-significant digits are transmitted as space character)	**___30.00**
Net weight	39	8	Formatted as per configuration (non-significant digits are transmitted as space character)	**__400.00**
Unit	47	2	kg, g , t or lb, for g and t: _ = second character is space	**g_**
Tare code	49	2	PT = Preset Tare; _T = Autotare __ = scale not tared, (_ = space character)	**PT**
Weighing range	51	1	Weighing range, only for multiple range scales, otherwise space character	**2**
Terminal-No.	52	3	As entered in Service Mode, group 'General'	**001**
Check sum	55	8	CRC16 checksum (non-significant digits are transmitted as space character)	**___45678**

In total: 62

RM Read Weight (in motion)

The RM command returns the weight immediately after receipt, even if the scale is in motion. The status bytes indicate whether the scale was settled or not.

If the RM command is used, the identification-No. is not increased. The identification-No. in the response data string is '0'.

Command

Field	Byte	Char's	Description	Example
RM	1	2	Command	**RM**
Scale-No.	3	1	Optional (see note about scale-No.)	**1**
	In total:	3		

Response

Field	Byte	Char's	Description	Example
Error code	1	2	00 = no error, see table error codes	**00**
Scale status	3	2	First Byte: 0 = scale settled 1 = scale in motion Second Byte: 0 = gross positive 1 = gross negative	**10**
Date	5	8	Date (formatted as per configuration)	**02.05.05**
Time	13	5	Time (formatted HH:MM)	**14:30**
Ident-No.	18	4	Always 0 (non-significant digits are transmitted as space character)	**___0**
Scale-No	22	1	Always '1' (see note about scale-No.)	**1**
Gross weight	23	8	Formatted as per configuration (non-significant digits are transmitted as space character)	**__430.00**
Tare weight	31	8	Formatted as per configuration (non-significant digits are transmitted as space character)	**___30.00**
Net weight	39	8	Formatted as per configuration (non-significant digits are transmitted as space character)	**__400.00**
Unit	47	2	kg, g , t or lb, for g and t: _ = second character is space	**g_**
Tare code	49	2	PT = Preset Tare; _T = Autotare __ = scale not tared, (_ = space character)	**PT**
Weighing range	51	1	Weighing range, only for multiple range scales, otherwise space character	**2**
Terminal-No.	52	3	As entered in Service Mode, group 'General'	**001**
Check sum	55	8	CRC16 checksum (non-significant digits are transmitted as space character)	**___45678**
	In total:	62		

20.4 Taring

TA Automatic Tare

In response to this command the scale is autotared.

Automatic taring is possible only if scale is settled. If no-motion cannot be detected within 10 seconds, the command is aborted and error code <15> is returned to the host. If required the host must then repeat the command.

Command

Field	Byte	Char's	Description	Example
TA	1	2	Command	**TA**
Scale-No.	3	1	Optional (see note about scale-No.)	**1**

In total: 3

Response

Field	Byte	Char's	Description	Example
Error code	1	2	00 = no error, see table of error codes	**00**

In total: 2

TM Manual Tare

The TM command is used to tare the scale with a value transferred from the host computer.

The tare value may include a decimal point or comma. The terminal rounds the tare value to the increment size of the scale. If the tare value exceeds the weighing range of the scale, error code <15> is returned to the host.

Command

Field	Byte	Char's	Description	Example
TM	1	2	Command	**TM**
Tare value	3	8	Including decimal point or comma	**000056,71**
Scale-No.	11	1	Optional (see note about scale-No.)	**1**

In total: 11

Response

Field	Byte	Char's	Description	Example
Error code	1	2	00 = no error, see table of error codes	**00**

In total: 2

TC Clear Tare

The tare is cleared and the scale is set to gross mode. The weighing terminal always returns <00>.

Command

Field	Byte	Char's	Description	Example
TC	1	2	Command	**TC**
Scale-No.	3	1	Optional (see note about scale-No.)	**1**
	In total:	3		

Response

Field	Byte	Char's	Description	Example
Error code	1	2	Always 00	**00**
	In total:	2		

20.5 Select Scale

SS Select Scale

Note: This command has no effect and is only implemented because of compatibility with existing PC programs.

Command

Field	Byte	Char's	Description	Example
SS	1	2	Command	**SS**
Scale-No.	3	1	Optional (is ignored)	**1**
	In total:	3		

Response

Field	Byte	Char's	Description	Example
Error code	1	2	00 = no error, see table of error codes	**00**
	In total:	2		

20.6 Set Scale To Zero

SZ Set Scale To Zero

The scale is set to gross zero. Zero setting is only possible if scale is within zero range. The terminal returns error code <00> when the command could be carried out correctly, if this is not the case, error code <15> is returned instead.

Command

Field	Byte	Char's	Description	Example
SZ	1	2	Command	**SZ**
Scale-No.	3	1	Optional (see note about scale-No.)	**1**
	In total:	3		

Response

Field	Byte	Char's	Description	Example
Error code	1	2	00 (if successful) or 15 (on error)	**00**
	In total:	2		

20.7 Prompts And Entries

DN Display Text Without Confirmation

The transmitted text string is written -left justified- into the display of the weighing terminal. The terminal returns error code <00>.

Command

Field	Byte	Char's	Description	Example
DN	1	2	Command	**DN**
Display text	3	1 - 20	1 to 20 characters max.	**Wait...**
	In total:	3 - 22		

Response

Field	Byte	Char's	Description	Example
Error code	1	2	Always 00	**00**
	In total:	2		

Notes:

- The command <DN> without text clears the display.
- The DY command (bargraph display) is not implemented.

DA Display Text With Acknowledgement

The transmitted text string is written -left justified- into the display. The terminal waits for a key to be pressed. All keys, except for the scale keys are accepted. The code of the pressed key is returned to the host (refer to 'Key And Error Codes'). Waiting on a key stroke can be aborted from the PC by sending any new command.

Command

Field	Byte	Char's	Description	Example
DA	1	2	Command	**DA**
Display text	3	1 - 20	1 to 20 characters max.	**Drum on scale?**

In total: 3 - 22

Response

Field	Byte	Char's	Description	Example
Error code	1	2	00 = no error, see table of error codes	**00**
Key code	3	1	See section 'Key And Error Codes'	**a**

In total: 3

DS Display Text For 3 Sec Without Acknowledgement

The transmitted text string is written -left justified- into the display of the terminal and shown for approx. 3 seconds. After this time has elapsed the terminal returns error code <00>.

Command

Field	Byte	Char's	Description	Example
DS	1	2	Command	**DN**
Display text	3	1 - 20	1 to 20 characters max.	**Wait...**

In total: 3 - 22

Response

Field	Byte	Char's	Description	Example
Error code	1	2	Always 00	**00**

In total: 2

DI Display Text With Data Input

The transmitted text string is written into the display.

Command

Field	Byte	Char's	Description	Example
DI	1	2	Command	**DI**
Display text	3	1 - 20	1 to 20 characters max., incl. input field specified by underline characters	**Article-No.** _____

In total: 3 - 22

Response

Field	Byte	Char's	Description	Example
Error code	1	2	00 = no error, see table of error codes	**00**
Text	3	1 - 20	Text field with input	**Article-No. 123**
Key code	23	1	See section 'Key And Error Codes'	**a**

In total: 3 - 23

The 20-digit text string consists of:

- Operator prompt (1 to 19 characters, left justified).
- Space characters to separate prompt from entry field and entry field determined by the trailing underline characters (1 to 19 characters), e.g. 'Article-No. _____'.
- When an entry is made, the underline characters are overwritten from left to right. If the entry field is to appear right justified on the display, the text string must be exactly 20 characters long, i.e. a corresponding number of space characters must be inserted between prompt and input field.

Examples:

Text in command string	Text in response string
1 2 12345678901234567890	1 2 12345678901234567890
Article ____	Article 123
Customer _____	Customer Smith

Confirm the entry by pressing the ↵- or ↑-key or one of the function keys **F0** to **F9,** Total, Info, Taring or Set Zero. The Clr-key is used for editing and cannot be used as confirmation (see also chapter 'Key And Error Codes'. The modified text string and the confirmation key are returned to the host.

Those positions in the data string, where underline characters were not overwritten, are returned as space characters, e.g. 'Article-No. 1234 '.

Waiting on a key stroke can be aborted from the PC by sending any new command.

RK Read Key Code Of Last-Pressed Key

Returns the code of the last-pressed key.

Command

Field	Byte	Char's	Description	Example
RK	1	2	Command	**RK**
	In total:	2		

Response

Field	Byte	Char's	Description	Example
Error code	1	2	00 = no error, see table of error codes	**00**
Key code	3	1	See section 'Key And Error Codes'	**a**
	In total:	3		

Note: If no key was pressed, a space character (20hex) is returned.

SP Set Setpoints

Sets the value for setpoint 1 or 2.

Command

Field	Byte	Char's	Description	Example
SP	1	2	Command	**SP**
Setpoint	3	1	1 or 2	**2**
Value	4	1 - 7	Including decimal point or comma, example: SP2100.5 sets setpoint 2 to 100.5	**100.5**
	In total:	4 - 10		

Response

Field	Byte	Char's	Description	Example
Error code	1	2	Always 00	**00**
	In total:	2		

20.8 Read / Set Digital I/Os

GI Read Digital Inputs

The GI command reads the status of the digital inputs of the weighing terminal.

Command

Field	Byte	Char's	Description	Example
GI	1	2	Command	**GI**
Input-No.	3	2	Number of input that is to be read, 01 = input 1 (IN0) 02 = input 2 (IN1) 00 = read both inputs.	**01**
	In total	4		

Response

Field	Byte	Char's	Description	Example
Error code	1	2	00 = no error, see table of error codes	**00**
Status	3	1 - 2	1- or 2-digit ASCII string, consisting of 0 and 1 (0 = Off, 1 = On) Examples: 1 Input IN0 On, in response to command GI01 to read input E1 01 Input IN0 Off, Input IN1 On, in response to command GI00 to read both inputs	**1**
	In total	3 - 4		

OS Set Digital Outputs

The OS command sets the specified output. The terminal always returns <00>.

Command

Field	Byte	Char's	Description	Example
OS	1	2	Command	**OS**
Output-No.	3	2	Number of output that is to be set, 01 = Output 1 (OUT0) 02 = Output 2 (OUT1)	**01**
		4		

Response

Field	Byte	Char's	Description	Example
Error code	1	2	00 = no error, see table of error codes	**00**
		2		

Note:

- In the Technical Manual and the schematics the outputs are referred to as OUT0 and OUT1. Thus, the command <OS01> sets output OUT0 and <OS02> sets OUT1.
- Only one output can be set at a time.

OC Clear Outputs

The OC command resets the specified output (off). If '00' is sent, both outputs are reset. The terminal always returns <00>.

Command

Field	Byte	Char's	Description	Example
OC	1	2	Command	**OC**
Output-No.	3	2	Number of output that is to be reset, 01 = Output 1 (OUT0) 02 = Output 2 (OUT1)	**01**
	In total:	4		

Response

Field	Byte	Char's	Description	Example
Error code	1	2	00 = no error, see table of error codes	**00**
	In total:	2		

Note: In the Technical Manual and the schematics the outputs are referred to as OUT0 and OUT1. Thus, the command <OC01> resets output OUT0 and <OC02> resets OUT1.

20.9 Key And Error Codes

The following table shows the keys -and their corresponding key codes- the operator may use to acknowledge a DI or DA command.

The key code of the pressed key is returned in the response data string.

Key at weighing terminal	Key code hexadecimal	Key code decimal	Available in DA command	Available in DI command
Enter ↵	C9	201	Yes	Yes
Up arrow ↑	C8	200	Yes	Yes
Function keys **F0 - F8**	F0 - F8	240 - 248	Yes	Yes
Function key **F9**	FC	252	Yes	Yes
Info	F9	249	Yes	Yes
Clr	C0	192	Yes	No *)
Total	FB	251	Yes	Yes
Set zero	C3	195	Yes	Yes
Taring	C4	196	Yes	Yes
0 - 9	30 - 39	48 - 57	Yes	No *)
.	2E	46	Yes	No *)
—	2D	45	Yes	No *)

*) These keys are used to *edit* the input field and cannot be used to *confirm* a DI command.

The following table shows the list of error codes that are returned by terminal in the case of an error. Code 00 indicates that no error has been detected.

Error-No.	Description
00	No error
11	General scale error (e.g. no connection to loadcell)
12	Scale overload (maximum weighing range exceeded)
13	Scale in motion (not settled after 10 seconds)
14	Scale not available
15	Error taring or zero setting (e.g. wrong tare format)
16	Printer not ready (offline)
17	Invalid printer command
31	Transmission error (e.g. data string too long or timeout)
32	Invalid command
33	Invalid parameter

21 Operating Mode 'RemoteD'

In the operating mode 'RemoteD' the IT3000Ex works as remote control unit for an external ITx000 weighing terminal or blackbox. The serial interface of the external weighing terminal is connected to the plug-on interface SIM10mA-Exi in the IT3000Ex via the separating module TS10mA Ex. It is not required to install a scale interface module ADM-Exi in the IT3000Ex. The continuous output of both, the IT3000Ex and the external weighing terminal must be set to 'SysTec protocol'. The data received by the IT3000Ex are displayed, and keyboard entries are sent to the external weighing terminal.

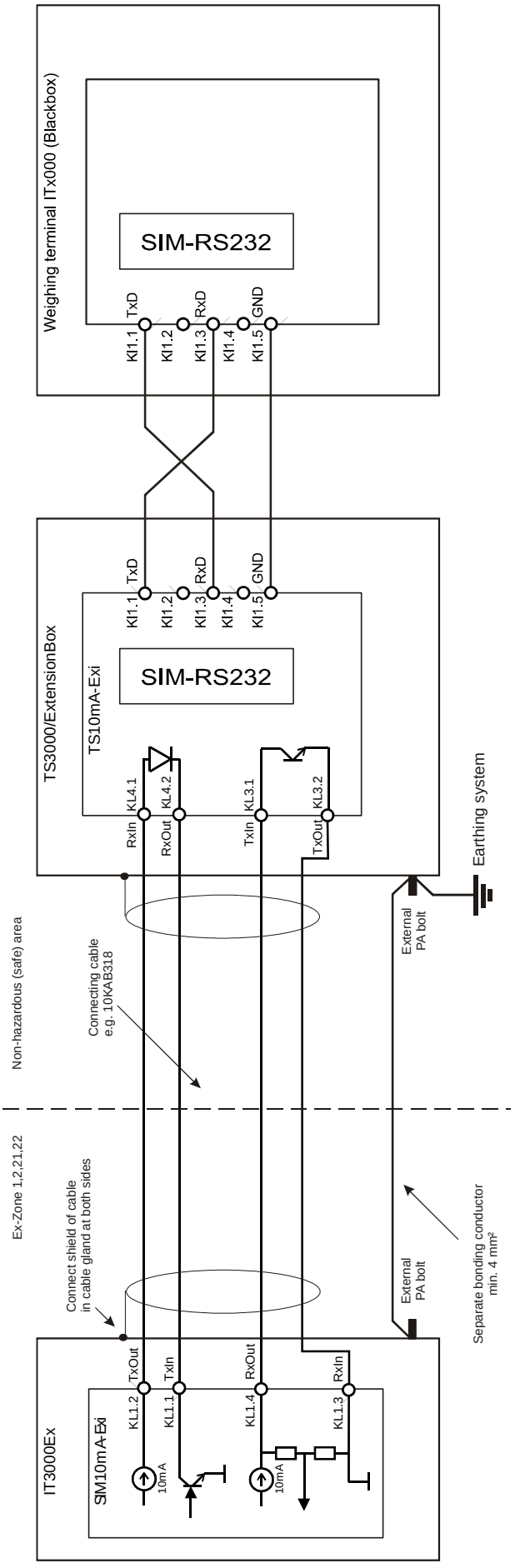
21.1 Interface Parameters

For the operating mode 'RemoteD' parameters in the Service Mode of the IT3000Ex must be set as follows:

Group 'Interface':		Group 'General':
9600 baud		'RemoteD'
8 data bits		
No parity		
No control (RS232) or Halfduplex (RS485-4)		

Note: Interface parameters of remote control unit and external weighing terminal must be identical.

21.2 Connection Example



22 Operating Mode 'ONLINE P'

In the operating mode 'ONLINE P' all functions of the weighing terminal are remotely controlled from the host system via Profibus DP. The transmission of data takes place through the exchange of data words.

Note: This operating mode is only available if the IT3000Ex is ordered with the custom program 'Online P' (IT3000Ex P).

22.1 Representation Of Input And Output Words

Weights are always represented without decimal point, trailing decimals are indicated as per the scale's calibration (weight as shown on the display).

Important note: The bit address in the I/O range of a PLC is organized byte-wise, i.e. EW0 (input word 0) is split into EB0 and EB1 (input byte 0 and 1) with EB1 containing the less significant bits!

Numerical representation as 16-bit binary number or bit pattern:

Word-No.	**n**															
Byte-No.	**n (High-Byte)**								**n + 1 (Low-Byte)**							
Bit-No.	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Value	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}

The range of values for 16-bit integer numbers is –32768 to 32765.

22.2 Input And Output Words

The following tables show an overview on the contents of the supported data words:

22.2.1 Input Words Of PLC

IW	*Word Contents*	*Word Type*	*Bit Addr.*	*Bit Contents*
0	Digital inputs *)	Discr. bits	.0 .1	Input E0 Input E1
1	digital outputs *)	Discr. bits	.0 .1 .2	Output A0 Filling fast Output A1 Filling slow Discharging
2	Net weight	Integer number		
3	Gross weight	Integer number		
4	Status	Discr. bits	.0 .1 .2 .3 .4 .5 .6 .7 .8 .9 .10 .11 : .15	Gross under zero Overload Scale in motion Error scale Number of trailing decimals 2^0 Number of trailing decimals 2^1 Number of trailing decimals 2^2 Weight x10 Handshake Status (1 = command carried out) Out of tolerance Flow rate low *reserved* Ready for start
5	Step counter (status of program during filling)	Integer number		0 Ready 1 Taring 2 Filling fast 3 Filling slow 4 Tolerance check not released 5 Tolerance check 6 Jogging 7 Out of tolerance
6	Net	Float number		High word
7	Net	Float number		Low word
8	Gross	Float number		High word
9	Gross	Float number		Low word
10	Step counter (status of program during discharging)	Integer number		0 Ready 1 Discharging 2 Extended discharging 3 Waiting on no-motion

*) See note at the end of table.

IW	*Word Contents*	*Word Type*	*Bit Addr.*	*Bit Contents*
11		**Integer number**		**Target filling / discharging**
12		**Integer number**		**Preact slow after correction**
13				***reserved***
14 : 23	**not for IT3000Ex**			***reserved calibration over Profibus***
24				***reserved***

The data word EW0 mirrors the status of the two digital inputs E0 and E1 of the IT3000Ex.

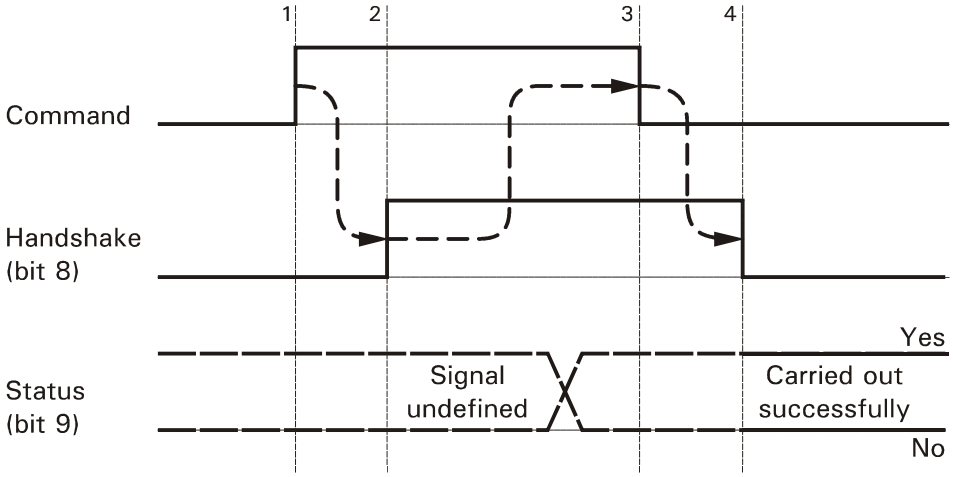
The data word EW1 contains the signals 'filling fast', 'filling slow' and 'discharging'. The signals 'filling fast' and 'filling slow' are also available as parallel outputs, however the signal 'discharging' must always be output via the PLC.

22.2.2 Output Words Of PLC

OW	*Word Contents*	*Word Type*	*Bit Addr.*	*Bit Contents*
0	Commands	Discr. bits	.0	Set zero
			.1	Auto taring
			.2	Set to gross
			.3	Manual taring
			.4	Filling without taring
			.5	Start filling
			.6	Start discharging
			.7	Interrupt filling / discharging
			.8	Abort filling / discharging
			.9	Acknowledge out-of-tolerance
			.10	Stop before tolerance check
			.11	Display text in AW16 - 25
			.12	)
			:	) *reserved*
			15	)
1	not for IT3000Ex			*reserved (digital outputs)*
2	Tare value	Integer number		
3	Target weight	Integer number		
4	Preact fast	Integer number		
5	Preact slow	Integer number		
6	+ Tolerance	Integer number		
7	– Tolerance	Integer number		
8	Settling time in ms	Integer number		
9	Jog pulse in ms	Integer number		
10	Weight difference for flow rate check	Integer number		
11	Time interval for flow rate check in ms	Integer number		
12	Zero range	Integer number		
13	Extended discharging time in ms	Integer number		
14				*reserved*
15				*reserved*
16: 25		2 characters		20-character display text
26	not for IT3000Ex			*reserved (calibration over Profibus)*

22.3 Exchange Of Control Signals

Receipt and execution of commands (see also output word 0) is acknowledged through bits 8 and 9 of data word 4 with handshake as per the following diagram:



Explanation: The receipt of a command (rising edge 1) is acknowledged with bit 8 (command received, rising edge 2). After that the command can be reset (falling edge 3). Once the command is reset and the instruction carried out, bit 8 is reset and bit 9 is set to a defined state (falling edge 4). If bit 9 is '1' that means that the instruction could be carried out correctly, if it is '0' that indicates an error, e.g. timeout.

Handshake signalling as described above applies to the commands (bits in output word 0) as follows:

.0	Set zero
.1	Autotaring
.2	Clear tare (set to gross)
.3	Manual tare
.5	Start filling
.6	Start discharging
.15	Read / write calibration data.

22.3.1 Read Weight Values

The values for net and gross weight are continuously updated and written into the input words 2 and 3. The weights are represented as signed integer values. For a correct interpretation of the weight, the status information in input word 4 must be evaluated.

Write:	----	----	
Read:	IW 2		Net
	IW 3		Gross
	IW 4	.0	Gross under zero
		.1	Overload
		.2	Scale in motion
		.3	Error scale
		.4 - .6	Number of trailing decimals (e.g. 010 for two decimals)
		.7	Weight x10 (e.g. for increment size 50kg)

Input Word IW 2: **Net**

The data word 2 contains the current net weight of the scale. The net weight is represented as a signed integer value and it corresponds to the measured value without decimal separator. The net weight is updated continuously.

Example: Net 1.000 kg Value 1000

Input Word IW 3: **Gross**

The data word 3 contains the current gross weight of the scale. The gross weight is represented as a signed integer value and it corresponds to the measured value without decimal separator. The gross weight is updated continuously.

Example: Gross 60.00 kg Value 6000

The data word IW 4 contains additional status / error information.

Bit

0: The gross weight is under zero.

1: The gross weight exceeds the capacity. Load must be removed.

2: Scale is in motion, weight is not stable.

3: Malfunction in weighing electronics, or insufficient loadcell signal or faulty connection to load sensor.

4 - 6: The bits 4, 5 and 6 indicate in binary encoded form the number of trailing decimals (decimal places right to the decimal point) as per the scale's calibration. (Bit 4 = 2^0; Bit 5 = 2^1; Bit 6 = 2^2), e.g. 010 for 2 trailing decimals.

Additionally, the weight values are availbale in data words 6/7 and 8/9 in float format. This format corresponds to the weight as shown on the display and does not require evaluation of trailing decimals.

22.3.2 Set Scale To Zero

If the weight is within zero setting range, the scale can be set to gross zero by means of bit 0 in data word 0.

Write:	OW 0	.0	Command for scale function 'Set Zero'
Read:	IW 4	.8 .9	Handshake signal Confirmation

22.3.3 Autotare Scale

Write:	OW 0	.1	Command for scale function 'Autotare'
Read:	IW 4	.8 .9	Handshake signal Confirmation

22.3.4 Clear Tare (Set To Gross)

Write:	OW 0	.2	Command for scale function 'Clear Tare'
Read:	IW 4	.8 .9	Handshake signal Confirmation

22.3.5 Tare Scale With Specified Value

Write:	OW 0	.3	Command for scale function 'Manual Tare'
	OW 2		Tare value
Read:	IW 4	.8 .9	Handshake signal Confirmation

The scale is tared with the value handed over in data word AW2.

22.3.6 Filling A Single Component

The host system can control a complete filling cycle with all pertaining parameters.

Write:	OW 0	.5 .7 .8 .9	Command for scale function 'Filling' Interrupt filling Abort filling Acknowledge out-of-tolerance
	OW 3		Target weight
	OW 4		Preact fast
	OW 5		Preact slow
	OW 6		+Tolerance
	OW 7		– Tolerance
	OW 8		Settling time in ms
	OW 9		Jog pulse in ms (if value is 0, jogging is disabled)
	OW 10		Weight difference for flow rate check (if value is 0, flow rate check is disabled)
	OW 11		Time interval for flow rate check in ms
Read:	IW 1	.0 .1	Filling fast Filling slow
	IW 4	.8 .9 .10 .11	Handshake, command received Confirmation, command carried out Out of tolerance Flow rate too low
	IW 11		Actual filling quantity
	IW 12		Preact slow after correction

Output Word OW 0: **Commands**

The bits in this data word can be used by the host to set control instructions:

Bit

5: Start Filling. A filling cycle is started. Prior to the start the data words 3 - 11 must be loaded with the appropriate values.

7: Interrupt. This bit is used to interrupt a filling or discharging cycle. Cycle is continued when bit 7 is reset.

8: Abort. When bit 8 is set, the filling or discharging cycle is terminated immediately.

Output Word OW 3: **Target Weight**

The data word 3 contains the integer value of the target weight for a filling cycle. Cut-off points are calculated as follows:

Cut-Off Point Fast = Target – Preact Fast – Preact Slow

Cut-Off Point Slow = Target – Preact Slow

The resolution of the target value is equal to the resolution of gross, tare and net weight. I.e. a comparison with a weight value can be made with the contents of the parameters as they are.

After the filling cycle has been completed, the actual value is written into data word 11. This value remains stored until the next cycle is started.

Output Word OW 4: **Preact Fast**

The data word 4 contains the integer value of the preact fast for a filling cycle. Cut-off points are calculated as follows:

Cut-Off Point Fast = Target – Preact Fast – Preact Slow

Cut-Off Point Slow = Target – Preact Slow

The resolution of the preact fast is equal to the resolution of gross, tare and net weight. If preact fast is set to '0', filling fast is skipped and filling is made in slow speed only.

Output Word OW 5: **Preact Slow**

The data word 5 contains the integer value of the preact slow for a filling cycle. Cut-off points are calculated as follows:

Cut-Off Point Fast = Target – Preact Fast – Preact Slow

Cut-Off Point Slow = Target – Preact Slow

The resolution of the preact slow is equal to the resolution of gross, tare and net weight.

The preact slow is corrected after each filling cycle and written into IW 12. The correction value depends on the size and the trend of the deviation. To prevent overshooting, deviations greater than 10% of target are ignored.

For the next filling cycle, the host system either transmits the corrected value (i.e. preact correction enabled) or the the original value (i.e. preact correction disabled).

Output Word OW 6: **+ Tolerance**

The data word OW 6 contains a permissible tolerance value by which the target value may be exceeded after filling. The tolerance value is relative to the target value. Example:

Target	6000
+ Tolerance	0002
Permissible Max. Weight	6002

A filling quantity of 6002 is still accepted, the error message 'Out Of Tolerance' is output when the filling quantity exceeds 6002.

An out-of-tolerance condition is always reported as exception and must be acknowledged by the host system (see also command Bit 9, OW 0).

Output Word OW 7: **– Tolerance**

The lower tolerance value determines the smallest permissible filling quantity. OW 7 contains the minus tolerance as difference to the target.

If minus tolerance is detected, the system either reports the out-of-tolerance condition or automatically starts jog feeding to correct the filling. Jog feeding is only performed when the parameter in OW 9 (Jog Pulse) contains a value greater 0.

An out-of-tolerance condition must be acknowledged by the host system (see also bit 9, OW 0).

Output Word OW 8: **Settling Time (ms)**

Data word OW 8 specifies a delay (integer value in milliseconds) between the completion of filling and the start of the tolerance check. After the settling time (which may also be zero) has elapsed, the system checks whether the scale has settled and only proceeds if this is the case. Otherwise it waits for the scale to settle. The settling time is started only when the bit 10 in data word OW 0 (stop before tolerance check) is zero, or after it has been set to zero.

Note: The parameter for the settling time is also used to determine the pause between two pulses for jog feeding.

Output Word OW 9: **Jog Pulse (ms)**

In most cases, minus tolerance can be avoided simply by activating jog feeding. The valve (or other appropriate feeding device) for slow filling is opened pulse-wise to reach the target value. The time for opening the valve is determined with the contents of OW 9 (in milliseconds).

After each pulse of the valve the settling time, specified in data word OW 8, must elapse. Subsequently, tolerance is checked again and a further jog pulse is released if weight is still in minus. This sequence is repeated until weight has exceeded the lower tolerance limit.

Output Word OW 10: **Quantity For Flow Rate Check**

Output Word OW 11: **Time Interval For Flow Rate Check**

Parameters in data words OW 10 and OW 11 belong together and are used to check the flow rate. Minimum flow rate is defined as quantity (OW 10) per interval (OW 11). The resolution of the quantity corresponds to the resolution of the other weight values (e.g. target weight). Time is indicated in milliseconds.

Example:

Display	1.000 kg
Parameter OW 10	1000
Parameter OW 11	10000

The minimum flow rate for filling and/or discharging is 1kg/10sec. When the flow rate falls short of the minimum rate, output signals for filling or discharging remain on but the error condition is reported to the host in Data Word IW 4 (Status), Bit 11.

Input Word IW 1: **Feeding Signals**

In this data word the feeding signals are transmitted that the host system must read and mirror on its own outputs to control the feeding device.

Bit

0: Feeding fast

1: Feeding slow.

Input Word IW 11: **Filling Quantity**

After the filling or discharging cycle has been completed, the actual value is written into data word IW 11. This value remains stored until the next cycle is started.

Input Word IW 12: **Preact Slow After Correction**

In a typical filling sequence the filling device is switched off *before* the target weight is reached to compensate for the amount of material that is still in flight. The value for this preact is transferred in data word OW 5 (Preact Slow). The preact correction algorithm optimizes this value dependent on the size and the trend of the deviation and writes the corrected preact value into data word IW 12.

22.3.7 Discharge Scale

The host system can control the discharging of a filled hopper.

Write:	OW 0	.6 .7 .8	Command for scale function 'Discharging' Interrupt discharging Abort discharging
	OW 10		Weight difference for flow rate check
	OW 11		Time interval for flow rate check
	OW 12		Zero range
	OW 13		Extended discharge time in ms
Read:	IW 1	.2	Discharging
	IW 4	.8 .9 .11	Handshake, command received Confirmation, command carried out Flow rate low
	IW 11		Discharged quantity

Output Word OW 0: **Commands**

The bits in this data word can be used by the host to set control instructions:

Bit

6: Discharging is started. Prior to the start the appropriate values must be written into the data words OW 10 - 13.

7: Interrupt. This bit is used to interrupt a discharging cycle. Cycle is continued when bit 7 is reset.

8: Abort. When bit 8 is set, the discharging cycle is terminated immediately.

Output Word OW 10: **Quantity For Flow Rate Check**

Output Word OW 11: **Time Interval For Flow Rate Check**

Parameters in data words 10 and 11 belong together and are used to check the flow rate. Minimum flow rate is defined as quantity (data word 10) per interval (data word 11). The resolution of the quantity corresponds to the resolution of the other weight values (e.g. target weight). Time is indicated in milliseconds.

Example:

Display 1.000 kg
Parameter 10 1000
Parameter 11 10000

The minimum flow rate for filling and/or discharging is 1kg/10sec. When the flow rate falls short of the minimum rate, output signals for filling or discharging remain on but the error condition is reported to the host in Data Word IW 4 (Status), Bit 11.

Output Word OW 12: **Zero Range**

After the start of a discharging cycle the discharging valve is opened. Discharging is controlled by the parameters in data words OW 12 (Zero Range) and OW 13 (Extended Discharging Time). The valve is closed after the zero range has been reached and the extended discharging time has elapsed.

Output Word OW 13: **Extended Discharge Time (ms)**

After reaching the zero range the closing of the valve is delayed by the extended discharging time. The value is specified in milliseconds. If the time is '0', the discharging valve is closed immediately when the gross weight reaches the zero range (data word OW 12).

Input Word IW 1: **Discharging**

In this data word the discharging signal is read by the host system and mirrored on its own output to control the discharging device:

Bit

2: Discharging.

The discharging signal is on until the zero range has been reached and the extended discharge time has elapsed.

Input Word EW11: **Discharging Quantity**

After the completion of a discharge cycle, data word IW 11 contains the discharged quantity as integer value. The value remains stored until the next filling or discharging cycle is started.

22.4 Data Word Monitor

With the data word monitor it is possible in the operating mode 'ONLINE P' to check the contents of input and output data words during running operation. The monitor is called up with the function keys F1 (input words) and F2 (output words), respectively.

01 1234 kg	Display in operating mode 'ONLINE P'. Except for the function keys listed below, the keyboard is locked.
F0	Switch weight display to tenfold resolution, automatic reset after approx. 5 sec.
F1	Call up monitor for input words
F2	Call up monitor for output words
F8	Exit operating mode 'ONLINE P'
→0←	Set gross weight to zero (within permissible zero setting range)

Data word monitor called up with F1:

IWØ 16 $0010	Monitor for input words (as seen from PLC), display of data word 0 (decimal and hexadecimal)
↵	Continue with next data word
↑	Return to previous data word
0..9	Enter number of data word whose contents is to be displayed
Info	Exit data word monitor
IW6 1147. $448F Example: Net weight = 1147kg, High word in data word IW6	For weight values that are transmitted in float format, the weight value is shown on the left hand side (as it appears on the display). Separated by a decimal point, on the right hand side the float number is shown in high word or low word, respectively.
↵	Continue with next data word
IW7 1147 $6000 Example: Net weight = 1147kg, Low word in data word IW7	

Data word monitor called up with F2:

OWØ 16 $0010	Monitor for output words (as seen from PLC)
↵	Continue with next data word
↑	Return to previous data word
0..9	Enter number of data word whose contents is to be displayed
Info	Exit data word monitor

23 Configuration Examples

23.1 Example 'BASIC'

Let us start with a very simple example: operating mode 'BASIC' with printout of date, time, gross, tare and net weight on a strip printer, no additional IDs. Our recommendation is always to start the layout with paper and pencil. The typical grid pattern is 10 characters per inch in width, and 6 lines per inch in length. Appropriate forms can be found further down in this manual.

```
          1         2         3         4
 12345678901234567890123456789012345678901

1 Date/Time  05.10.01/10:20
2 Gross           136.0kg
3 Tare            100.0kgPT
4 Net              36.0kgC
```

This printout consists of 12 fields, that are defined as follows:

Field-No.	Block	Line	Column	Attribute	Source	Content
1	2	1	1	none	Text	Date
2	2	1	6	none	Text	/
3	2	1	7	none	Text	Time
4	2	1	12	none	Fetch	Date
5	2	1	20	none	Text	/
6	2	1	21	none	Fetch	Time
7	2	2	1	none	Text	Gross
8	2	2	14	none	Fetch	Gross
9	2	3	1	none	Text	Tare
10	2	3	14	none	Fetch	Tare
11	2	4	1	none	Text	Net
12	2	4	14	none	Fetch	Net

Explanation:

All fields on the printout are positioned by specifying the line- and the column-No. of the *left-most* character in the string that is to be output. For field 1 with the text 'Date' that can be easily recognized, line 1 / column 1 points to the 'D' in 'Date'.

For field 8 (gross weight of scale) that is already a little more difficult to spot, it must be taken into consideration that weight values are internally represented as an 8-character string and that leading zeros are suppressed. Thus the output of the gross weight indeed starts in column 14, although the first character appears in column 17.

A similar effect applies to the unit sign that is automatically appended to the weight value. For gross weights the unit sign has always a length of 2 characters (e.g. 'kg'), for tare weights the length is 4 characters (e.g. 'kgPT' for manual tare), while the net weight sign is 3 characters long (e.g.'kgC' for calculated net weights). If fewer characters are required for the correct representation of the unit sign (e.g. 't' or 'kg' for autotared tare weights), the gap is filled with a corresponding number of space characters. When a printout is drafted, the actual length of all variables must be considered and overlapping avoided, or -depending on the type of printer- some very strange effects may appear.

The fields 1 (Date), 3 (Time), 7 (Gross), 9 (Tare) and 11 (Net) are chosen from the existing text table, field 2 -stroke- (/) is entered as an additional text field, that can also be used in field 5. With a little more experience it is certainly possible to combine the fields 1, 2, 3 to one field with the text 'Date/Time'. This is the recommended approach for more complex applications coming close to the limit of 32 fields in total. It is not mandatory to number the fields in rising order without gaps (although

this usually helps to structure one's own work). Fields may remain free by assigning the 'not used' attribute.

Our sequence uses the cyclic part only, and does not have a header or totals section, hence all fields are in block 2.

Extensions:

Expanded printing of net weight:

```
              1         2         3         4
     1234567890123456789012345678901234567890

   1 Date/Time  05.10.01/10:35
   2 Gross           136.0kg
   3 Tare             21.0kgPT
   4 Net        115.0kgC
```

To this effect the print attribute 'Expand' must be assigned to the field 12:

Field-No.	Block	Line	Column	Attribute	Source	Content
12	2	4	6	Expanded	Fetch	Net

The field has been moved to column 6, since the printout now requires twice as much space as before (of course you can leave the print position as is, the printout is then shifted to the right).

Addition of consecutive number:

```
              1         2         3         4
     1234567890123456789012345678901234567890

   1 Date/Time  05.10.01/10:35 Cons.-No.    1
   2 Gross           136.0kg
   3 Tare             21.0kgPT
   4 Net        115.0kgC
```

Addition of 2 fields for the text and the consecutive-No.:

Field-No.	Block	Line	Column	Attribute	Source	Content
13	2	1	27	–	Text	Cons.-No.
14	2	1	37	–	Fetch	Consec.-No.2

Please note that it is possible at any time to add fields at any position in the printout (here: field 13 and 14 between the existing fields 6 and 7). One restriction applies to fields that are also used for data entries. Inputs are made following the rising order of field-Nos. within a block.

The system variable 'Consec.-No.2' has 4 digits. When it is printed, leading zeros are suppressed. The consecutive-No. 2 can be preset to any value in the Supervisor Mode, and it is increased by 1 with every completed cycle in block 2. If a totals section (block 3) is configured, Consec.-No 2 is reset to 1 after this block has been carried out.

Consec.-No. 1 can also be preset in the Supervisor Mode, however its value is only increased by 1 after carrying out block 3 - if there is any. Through this differentiation it is possible, for instance, to use 'Consec.-No. 2' as a counter for individual items on a shipping note, whereas 'Consec.-No. 1' serves as ticket-No.

Addition of blank lines:

In our present configuration, the first line for the second cycle is printed under the last line of the first cycle. In many cases, however it is desired to separate the individual printouts by inserting a number of blank lines, in the example below 2 empty lines.

```
          1         2         3         4
12345678901234567890123456789012345678901
1  Date/Time  05.10.01/12:45 Cons.-No. 4531
2  Gross           136.0kg
3  Tare             21.0kgPT
4  Net        115.0kgC
5
6
7  Date/Time  05.10.01/12:46 Cons.-No. 4532
8  Gross           152.0kg
9  Tare             21.0kgPT
10 Net        131.0kgC
11
12
```

To insert two blank lines, a new field is configured to output a space character in line 6. This has the effect of two blank lines (5 and 6) and the next printout is started in line 7.

Field-No.	Block	Line	Column	Attribute	Source	Content
15	2	6	1	–	Text	<Space>

Calculation and printout of totals:

As a further extension we now want to calculate the total net weight of a number of weighings and print it after pressing the Total-key. For improved readability, we change the print of the net weight back to normal width and print only the total of the net weight in double width. Here we must keep in mind that the system variables for totals have a length of 10 characters, i.e. unless we want to reconfigure the whole printout, we must shift the net total to the right. Also the unit sign for weight totals is automatically appended (e.g. 'kg'), it has always a length of two characters.

```
          1         2         3         4
12345678901234567890123456789012345678901
 1 Date/Time  05.10.01/13:15 Cons.-No.    1
 2 Gross           136.0kg
 3 Tare             21.0kgPT
 4 Net             125.0kg
 5
 6
 7 Date/Time  05.10.01/13:16 Cons.-No.    2
 8 Gross           152.0kg
 9 Tare             21.0kgPT
10 Net             131.0kgC
11
12

31 Date/Time  05.10.01/13:18 Cons.-No.    6
32 Gross           140.0kg
33 Tare             21.0kgPT
34 Netto           129.0kg
35
36
37 Date/Time  05.10.01/13:21 Cons.-No.    7
38 Gross           151.0kg
99 Tare             21.0kgPT
40 Net             130.0kgC
41
42
43 Total Net            904.5kg
44
```

Field-No.	Block	Line	Column	Attribute	Source	Content
16	3	1	1	–	Text	Total Net
17	3	1	13	Expand	Fetch	Total Net
18	3	3	1	–	Text	<Space>

With field Feld 16 the entered text 'Total Net' ist printed, field 17 prints the accumulated net weight (starting in column 13), and field 18 again generates two blank lines. After that the totals memory is cleared, consecutive-No. 2 reset to 1, and a new cycle can be started.

Print of a heading:

In the next step we will configure a headline, containing an article-No., a customer-No. and a ticket-No. This requires two input fields in the sequence (up to now, we do not have any inputs yet), which we want to configure in such a way that the customer-No. remains stored after print of total, whereas the article-No. is cleared and must be entered anew.

```
                1         2         3         4
       1234567890123456789012345678901234567890

 1     Customer 4728 Article A3761 Ticket 10001
 2
 3
 4     Date/Time  05.10.01/13:15 Cons.-No.    1
 5     Gross          136.0kg
 6     Tare             21.0kgPT
 7     Net             125.0kgC
 8
 9
10     Date/Time  05.10.01/13:16 Cons.-No.    2
11     Gross          152.0kg
12     Tare             21.0kgPT
13     Net             131.0kgC
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
34     Date/Time  05.10.01/13:18 Cons.-No.    6
35     Gross          140.0kg
36     Tara             21.0kgPT
37     Net             129.0kgC
38
39
40     Date/Time  05.10.01/13:21 Cons.-No.    7
41     Gross          151.0kg
42     Tare             21.0kgPT
43     Net             130.0kgC
44
45
46     Total Net               904.5kg
47
48
49     Customer 4728 Article B2435 Ticket 10002
50
51
52     Date/Time  05.10.01/13:25 Cons.-No.    1
53     Gross          124.0kg
```

The fields 20, 22 and 24 are text fields for the printout. Fields 20 and 22 are also used as operator prompts for the entries. Field 21 is configured as 'numerical, 4 digits, no trailing decimals, store after print', the corresponding assignment for field 23 is 'string, 5 characters, clear after print'. By assigning the property 'String', entry of alpha characters is enabled, although it is not recommended to use alpha characters for frequently requested entries. Field 26 serves to generate 2 blank lines by outputting a space character.

Field-No.	Block	Line	Column	Attribute	Source	Content	Prompt
20	1	1	1	–	Text	Customer	–
21	1	1	7	–	Input	9999	Customer
22	1	1	14	–	Text	Article	–
23	1	1	22	–	Input	XXXXX	Article
24	1	1	30	–	Text	Ticket	–
25	1	1	36	–	Fetch	Consec.No1	–
26	1	3	1	–	Text	<Space>	–

Sequence and printout fully comply with the requirements, although our approach was not a 'monolithic' one, instead we have tinkered around a bit and added piece by piece. Consolidated, and configured in the sequence that you would normally use, our application looks as shown below. As a further extension, entry of a price / Eur in block 1 and the calculation of amount, VAT and total amount in block 3 were added.

Field-No.	Block	Line	Column	Attribute	Source	Content	Prompt
1	1	1	1	–	Text	Customer	–
2	1	1	10	–	Input	9999	Customer
3	1	1	15	–	Text	Article	–
4	1	1	23	–	Input	XXXXX	Article
5	1	1	29	–	Text	Ticket	–
6	1	1	36	–	Fetch	Consec.-No.1	–
7	1	2	1	–	Text	Price/kg Eur	
8	1	2	14	–	Input	99,99	Price/kg Eur
9	1	4	1	–	Text	<Space>	–
10	2	1	1	–	Text	Date/Time	–
11	2	1	12	–	Fetch	Date	–
12	2	1	20	–	Text	/	–
13	2	1	21	–	Fetch	Time	–
14	2	2	1	–	Text	Gross	–
15	2	2	14	–	Fetch	Gross	–
16	2	3	1	–	Text	Tare	–
17	2	3	14	–	Fetch	Tare	–
18	2	4	1	–	Text	Net	–
19	2	4	14	–	Fetch	Net	–
20	2	1	27	–	Text	Cons.-No.	–
21	2	1	37	–	Fetch	Consec.-No.2	–
22	2	6	1	–	Text	<Space>	–
23	3	1	1	–	Text	Total	–
24	3	1	13	Expanded	Fetch	Total Net	–
25	3	2	1	–	Text	Amount Eur	–
26	3	2	14	–	Calculate	F24 x F08 (8,2)	–
27	3	3	1	–	Text	VAT 16% Eur	–
28	3	3	14	–	Calculate	F26 x F33 (8,2)	–
29	3	4	1	–	Text	Tot.Amount Eur	–
30	3	4	14	–	Calculate	F26 + F28 (8,2)	–
31	3	6	1	–	Text	<Space>	–
32	N/U						–
33	–	–	–	–	–	0.16	–

Calculations are performed in fields 26, 28 and 30. The VAT rate is entered as constant in field 33 (entry in Service Mode, group 'General').

The complete printout looks then as follows:

```
          1         2         3         4
12345678901234567890123456789012345678901234567890

 1 Customer 4728 Article A3761 Ticket 10001
 2 Price/kg Eur 13.25
 3
 4
 5 Date/Time  05.10.01/13:15 Cons.-No.    1
 6 Gross           136.0kg
 7 Tare             21.0kgPT
 8 Net             125.0kgC
 9
10
11 Date/Time  05.10.01/13:16 Cons.-No.    2
12 Gross           152.0kg
13 Tare             21.0kgPT
14 Net             131.0kgC

35 Date/Time  05.10.01/13:18 Cons.-No.    6
36 Gross           140.0kg
37 Tar              21.0kgPT
38 Net             129.0kgC
39
40
41 Date/Time  05.10.01/13:21 Cons.-No.    7
42 Gross           151.0kg
43 Tare             21.0kgPT
44 Net             130.0kgC
45
46
47 Total                904.5kg
48 Amount     Eur  11984.63
49 VAT  16%   Eur   1917.54
50 Tot.Amount Eur  13902.17
51
52
53 Customer 4728 Article B2435 Ticket 10002
54 Price/kg Eur  3.50
55
56
57 Date/Time  05.10.01/13:35 Cons.-No.    1
```

Our example quite clearly illustrates the possibilities of sequence and printout configuration, but also its limitations. This example uses 31 out of 32 fields and all 10 texts that can be entered. So you cannot expect much more.-

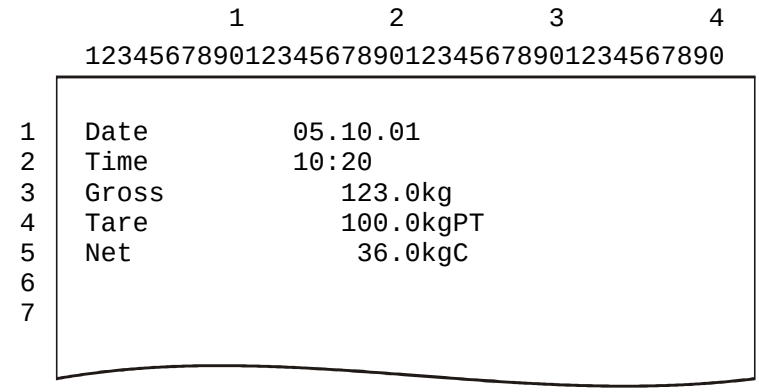
23.2 Example 'FILL 1 / 2'

```
          1         2         3         4
12345678901234567890123456789012345678901234567890
 1  Line 1
 2  Ticket-No.    1
 3  Target      0.200
 4
 5  Date    01.02.05   No.   1
 6  Time    14:49
 7  Gross      0.205kg
 8  Tare       0.000kg
 9  Net        0.205kg
10
11  Date    01.02.05   No.   2
12  Time    14:49
13  Gross      0.205kg
14  Tare       0.000kg
15  Net        0.205kg
16
17  Total      0.410kg
```

Field-No.	Block	Line	Column	Attribute	Source	Content	Prompt
1	1	1	2	–	Text	Line 1	–
2	1	2	2	–	Text	Ticket-No.	–
3	1	2	14	–	Fetch	Consec.-No.1	–
4	1	3	2	–	Text	Target	–
5	1	3	11	–	Fetch	Target	–
6	2	2	2	–	Text	Date	–
7	2	2	10	–	Fetch	Date	–
8	2	2	21	–	Text	No.	–
9	2	2	24	–	Fetch	Consec.-No.2	–
10	2	3	2	–	Text	Time	–
11	2	3	10	–	Fetch	Time	–
12	2	4	2	–	Text	Gross	–
13	2	4	10	–	Fetch	Gross	–
14	2	5	2	–	Text	Tare	–
15	2	5	10	–	Fetch	Tare	–
16	2	6	2	–	Text	Net	–
17	2	6	10	–	Fetch	Net	–
18	3	2	2	–	Text	Total	–
19	3	2	8	–	Fetch	Total Net	–

23.3 Factory Setting

As factory setting a 'Simple Weighing' format is loaded, configured as follows:



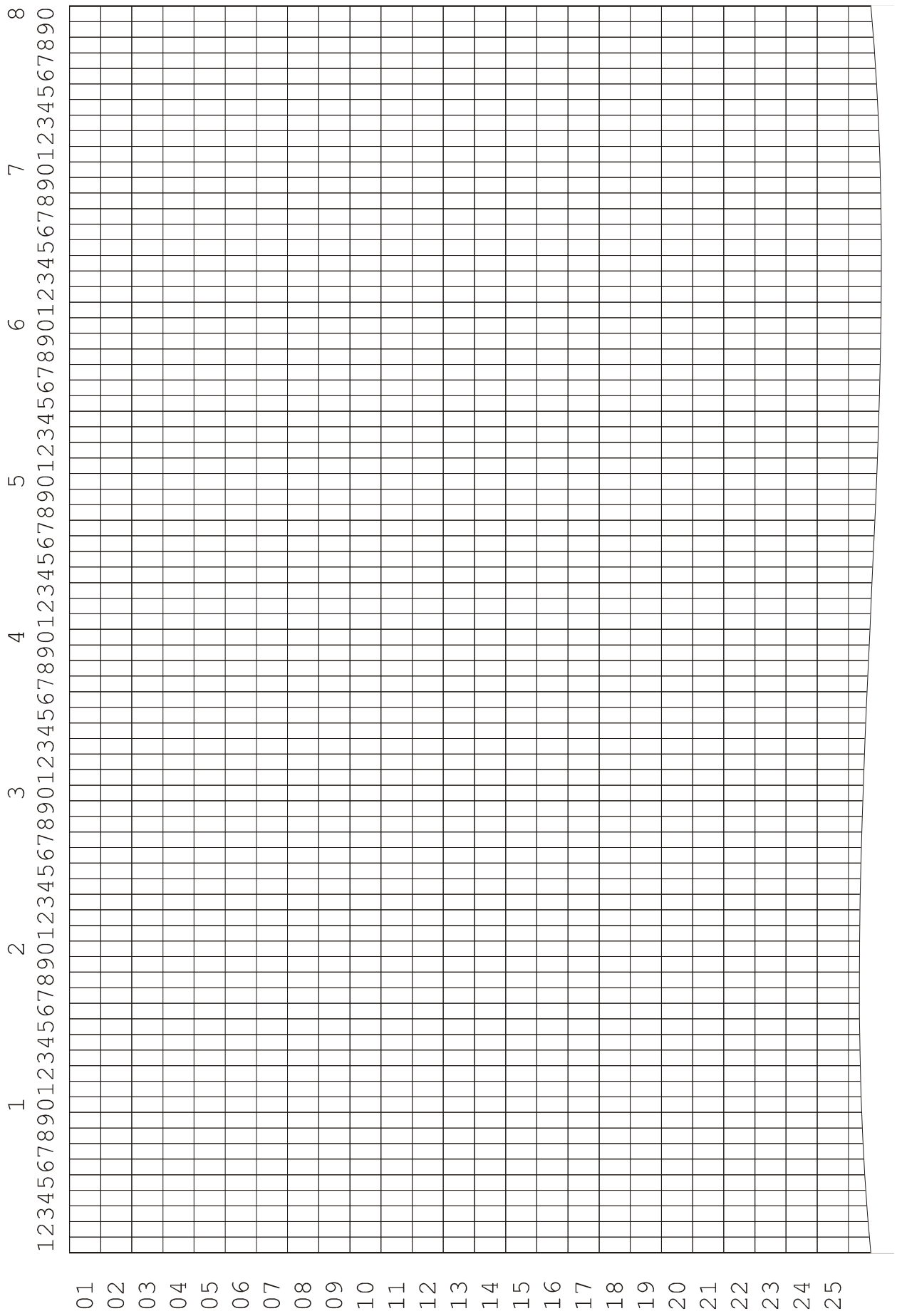
Field-No.	Block	Line	Column	Attribute	Source	Content
1	2	1	1	–	Text	Date
2	2	1	14	–	Fetch	Date
3	2	2	1	–	Text	Time
4	2	2	14	–	Fetch	Time
5	2	3	1	–	Text	Gross
6	2	3	14	–	Fetch	Gross
7	2	4	1	–	Text	Tare
8	2	4	14	–	Fetch	Tare
9	2	5	1	–	Text	Net
10	2	5	14	–	Fetch	Net
11	2	7	1	–	Text	<Space>

23.4 Field Length Of System Variables

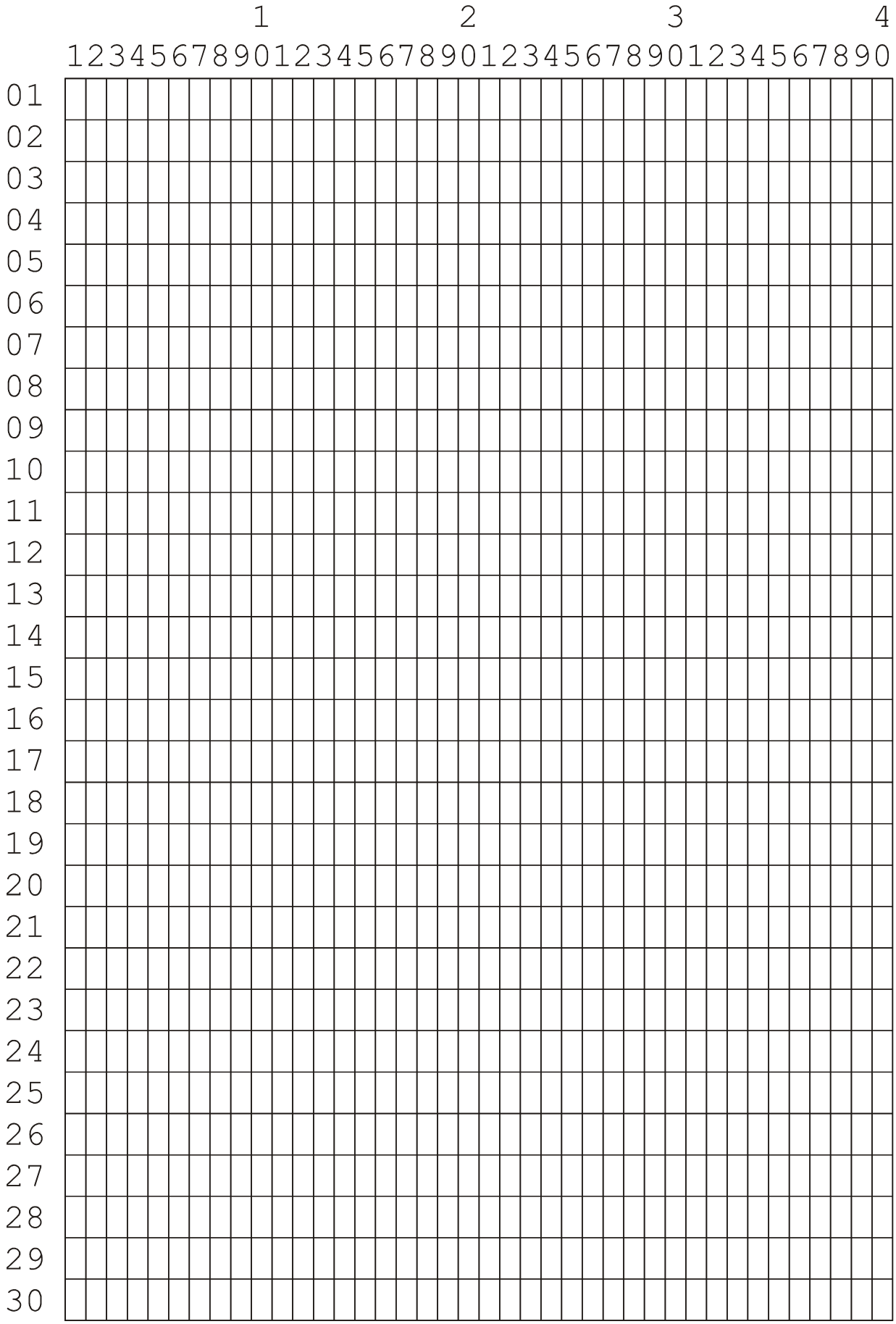
For the configuration of printouts the field length of system variables must be observed to avoid overlapping.

System variable	Field length (characters)	Operating mode
Gross, tare, net weight	8	all
Unit sign gross	2	all
Unit sign tare	4	all
Unit sign net	3	all
Weight totals	10	all
Unit sign totals	2	all
Unit of calibration	2	all
Date	8	all
Time	5	all
Consec.-No. 1	5	all
Consec.-No. 2	4	all
Target	8	FILL

23.5 Form For Print Layouts (80 Columns)



23.6 Form For Print Layouts (40 Columns)



23.7 Form For Configuration

Field-No.	Block	Line	Column	Attribute	Source	Content	Prompt
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
32							
33							
34							

24 Data Transmission

The data transmission (possible only if no proínter is connected) combines fields of block 1 and block 2 which have been configured with 'Input' (operator entry), 'Fetch' (access to system variable) or 'Calculate' (arithmetical operation on fields). Fields generated with 'Text' (predefined or entered text string) are ignored.

If data transmission is enabled, a data string is sent to the host system after each completed cycle in block 2, containing all relevant fields of block 1 and 2. This is the case, for instance, after a completed filling cycle (operating mode 'FILL 1 /2') or after confirming the result of the classification (operating mode 'CHECK').

The sequence follows the rising order of field-Nos. Additionally, start and end character plus checksum and terminal-No. are transmitted. The individual fields are separated from each other with semicolon. Fields in block 3 are not transmitted. The principal structure of a data string looks as follows:

STX	Start character, is omitted when configured as 00
999	Terminal-No, as specified in the group 'General'
;	Separator
Feld n	Contents of first field in block 1
;	Separator
. . .	Contents of further fields, separated by semicolon
;	Separator
Feld m	Contents of last field in block 1
;	Separator
Feld u	Contents of first field in block 2
;	Separator
. . .	Contents of further fields, separated by semicolon
;	Separator
Feld v	Contents of last field in block 2
;	Separator
ETX	End character, is omitted when configured as 00
Checksum	Checksum, as specified in the configuration

Notes:

- If a value contains a decimal separator, this is also transmitted. Example: a 6-digit numeric entry with two trailing decimals is internally represented as 9999.99 and transmitted in this format.
- Characters not entered or non-significant digits are transmitted as space characters (same as printed).
- For the transmission the ACK/NAK protocol is used (see description further down below).

24.1 Data Transmission Example 1

For the factory-set default printing (Simple Weighing) a data string is sent after each printout as follows:

Content	Print Field	
STX		Start character, is omitted when entered as 00
999		Terminal-ID, as specified in group 'General' of Service Mode
;		Separator
Date	**2**	8 characters (99.99.99)
;		Separator
Time	**4**	5 characters (99:99)
;		Separator
Gross	**6**	8 characters (99999999), format as per calibration, plus unit sign, 2 characters
;		Separator
Tare	**8**	8 characters (99999999), format as per calibration, plus unit sign, 4 characters
;		Separator
Net	**10**	8 characters (99999999), format as per calibration, plus unit sign, 3 characters
;		Separator
ETX		End character, is omitted when configured as 00
Checksum		Checksum, as specified in the configuration

24.2 Data Transmission Example 2

For the configuration example with header, capturing of weight and price calculation, the data string looks as follows:

Content	Print Field	
STX		Start character, is omitted when entered as 00
999		Terminal-ID, as specified in group 'General' of Service Mode
;		Separator
Customer	**2**	4 digits (9999)
;		Separator
Article	**4**	4 characters (XXXX)
;		Separator
Ticket	**6**	Consecutive-No. 1; 5 digits (99999)
;		Separator
Price/kg	**8**	5 digits (99.99)
;		Separator
Date	**11**	8 characters (99.99.99)
;		Separator
Time	**13**	5 characters (99:99)
;		Separator
Gross	**15**	8 characters (99999999), format as per calibration, plus unit sign, 2 characters
;		Separator
Tare	**17**	8 characters (99999999), format as per calibration, plus unit sign, 4 characters
;		Separator
Net	**19**	8 characters (99999999), format as per calibration, plus unit sign, 3 characters
;		Separator
Item Counter	**21**	Consecutive-No. 2; 4 digits (9999)
;		Separator
ETX		End character, is omitted when configured as 00
Checksum		Checksum, as specified in the configuration

Fields in the totals section (block 3) are not transmitted.

24.3 Protocol For Data Transmission

For the data transmission the ACK/NAK protocol is used (except for operating modes ONLINE and TRUCK/ONLINE which use the ONLINE protocol described in the respective chapter). The ACK/NAK protocol is carried out as described below:

Weighing terminal → PC

Control Character / Data	Comment
Start character	Can be selected or deselected in Service Mode
Data fields in ASCII-format	Data fields and their length, sequence and decimal point location depend on the configuration. The individual fields are separated from each other with a semicolon.
End character	Can be selected or deselected in Service Mode
Checksum	Can be selected or deselected in Service Mode, options: XOR, compliment of twos, no checksum

PC → weighing terminal

Control Character / Data	Comment
ACK	Positive confirmation for correctly received data string

or

PC → weighing terminal

Control Character / Data	Comment
NAK	Negative confirmation for not correctly received data string

The timeout delay for the reception of ACK or NAK is 6 sec. If a response cannot be received within 6 sec or if a negative response is received (NAK), the transmission of the data string is repeated up to 4 times.

If after a total of 5 transmission attempts a response cannot be received or if only negative responses are received, an error message is indicated on the display of the terminal which must be acknowledged by the operator. The operator has the choice either to start the transmission anew by pressing the ↵-key (e.g. after rectifying the problem) or switch off the data transmission by pressing the F8-key.

24.4 Continuous Output

Theserial interfaces COM1 can be configured as continuous output. Several protocols can be selected: standard protocol for the connection of a remote display, TOLEDO® protocol (Continuous Mode) and TOLEDO® TSM protocol, Flintec protocol The choice is made in group 'General' of the Service Mode. Only one out of the three peripheral devices that the terminal supports (PC, printer, remote display) may be connected at any time. When the terminal is configured, conflicts in the assignment of interfaces must be avoided.

Setting of interface parameters is made in group 'Interface' of the Service Mode.

24.4.1 Standard Protocol

To connect a remote display to the serial interface a string is output continuously.

The data string consists of 15 ASCII characters plus CR and LF. It includes a status for motion / no motion, the net weight and the unit sign. Digits not used are filled with space characters. Examples:

Digit: '123456789012345'

'S 10.98 t '	S = Scale settled (no motion),
'SD 10980 kg'	SD = Scale in motion (not settled),
	13th character always space.

24.4.2 Flintec Protocol

The data string to connect a Flintec remote display consists of 1 start character (@), 7 ASCII characters for the net weight plus CR. Example:

Char.: '123456789'

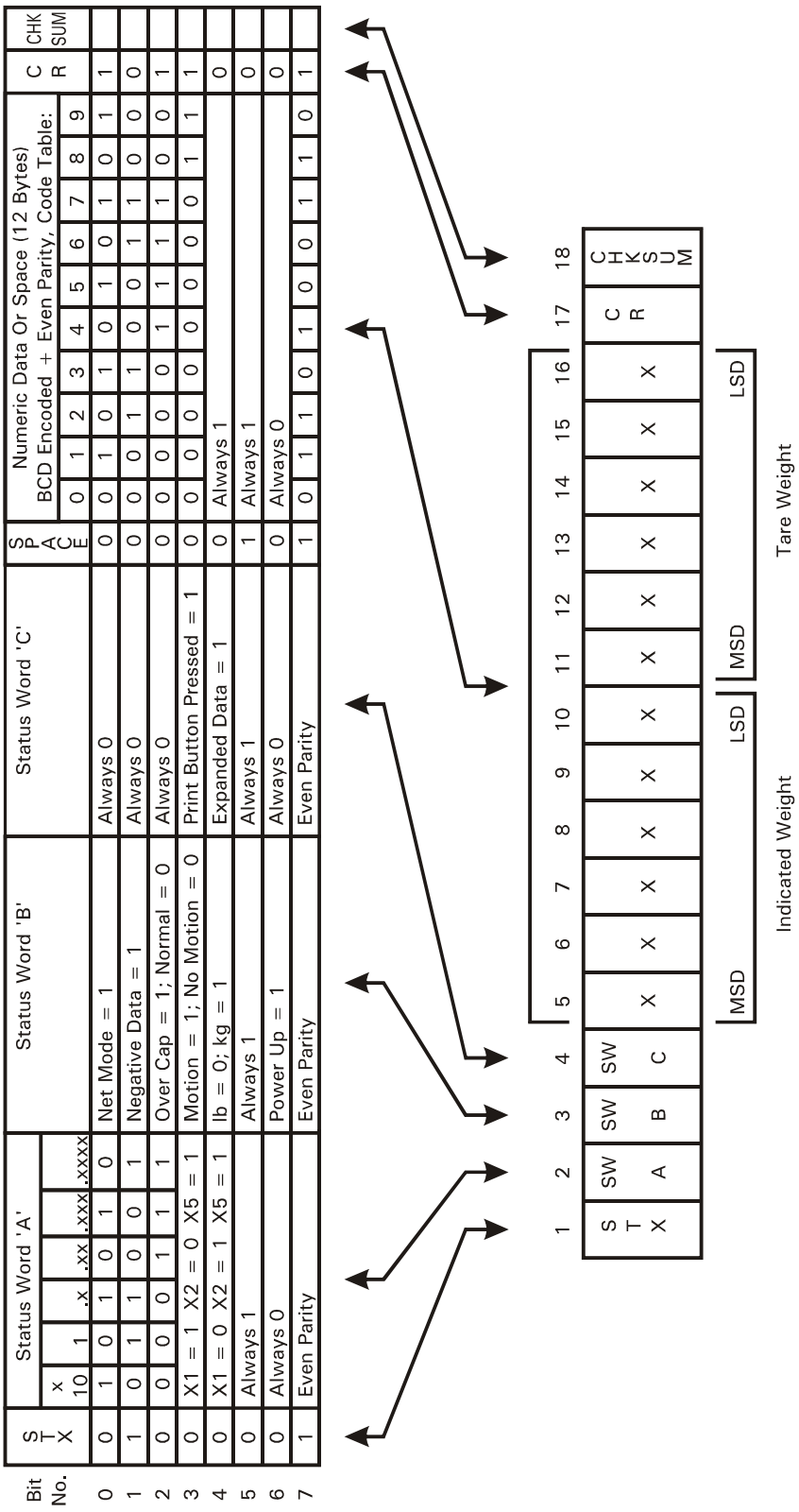
'@ 10.95^{C_R}'	1. character always @ (Hex 40)
	9. character always CR (Hex D)
	non-significant digits of the weight value are transmitted as space characters (Hex 20).

24.4.3 Special Protocol

This is a placeholder for a customized protocol, not part of the standard program.

24.4.4 TOLEDO® Protocol

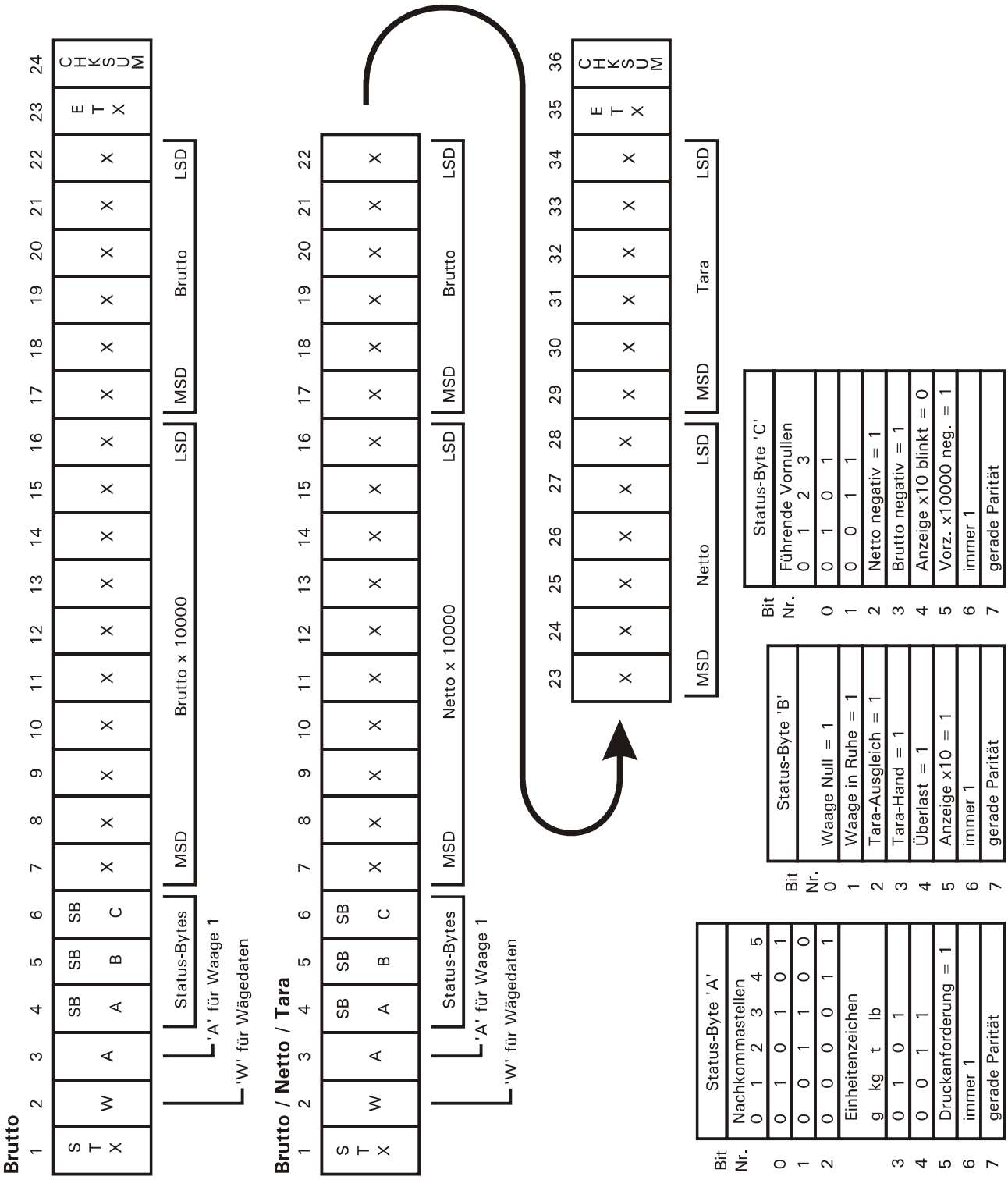
The data string emulates the essential functions of the Continuous Mode as it is output by digital indicators of the series TOLEDO® 8132, 8140, 8142, 8520, 8530 etc.



Transmission parameters are: 4800 baud, 7 data bits, even parity, no hardware handshake. Checksum is defined as the 2's complement of the 7 low order bits of the binary sum of the 7 low order bits of all characters preceeding the checksum including STX and CR. Bit 8 of the checksum is parity over the 7 low order bits of checksum.

24.4.5 TOLEDO® TSM Protocol

The data string emulates the essential functions of digital indicators of the series TOLEDO® TSM1020, 1050 etc. (weighing data).



25 Transport, Maintenance And Cleaning

25.1 Transport

Note:

- Transport and storage of the weighing terminal must only be made in designated cardboard box with foam cushions.
- Do not expose the unit to extreme temperatures, humidity, shocks or vibrations.
- Storage temperature –10 to +50°C at 95% max. relative humidity without condensation.

25.2 Maintenance

Ex **Maintenance at regular intervals must be carried out by qualified personnel (see chapter 6.1) authorized by SysTec GmbH. At these inspections first of all it must be made sure that the housing is tight, all cables are undamaged and all screws are securely fastened.**

Maintenance of scale platforms is required at regular intervals depending on use and environment. The accuracy of scales can be affected by dirt, foreign objects, etc. and appropriate maintenance is strongly recommended. Also recommended is the calibration with certified test weights at regular intervals.

A function check is possible with the program Service Mode.

25.3 Cleaning

- Only permit qualified personnel to operate this unit! Disconnect all power to this unit before cleaning!
- The keyboard overlay is resistant against acetone, trichlorine, alcohol, ether, nitric acid (20%), hexane, sulfuric acid (20%) and all-purpose cleaning agents.

Ex **Clean the keyboard with a soft clean cloth that has been dampened with a mild window type cleaner. Do not spray cleaner directly on the unit. Concentrated leaches or acids or pure alcohol must not be used. In order to avoid electrostatic charge, do not rub or wipe the keyboard with a dry cloth.**

If cleaning agents are used that contain leach, acid or alcohol, pure water must be used to wash off any residue.

The weighing terminal is protected to IP65 (protection against low pressure water jets).

25.4 Security Check

Ex

Safe operation is no longer warranted if:

- **housing or keyboard is damaged**
- **connected cables, cable entry or equipotential bonding are damage**
- **the connected power supply unit is damaged**
- **the display remains dark after switching the unit on.**

In these cases disconnect all power to the unit and contact your service station authorized by SysTec.

25.5 Functional Test

The functionality of the weighing terminal ist tested during calibration of the scale with test weights. The digital inputs / outputs and the serial interface can be tested in the Service Mode (hardware test).

25.6 Repair

Immediately disconnect all power to a damaged unit.

Only qualified service personnel (see chapter 6.1), authorized by SysTec GmbH, may carry out repair work using genuine factory supplied spare parts.

25.7 De-Installation

1. Disconnect all power to the unit.
2. Remove cabling.
3. Use suitable tool to de-install weighing terminal.

25.8 Disposal

For the disposal of the weighing terminal all coutry-specific and locally applicable regulations must be observed!

26 Trouble Shooting

Ex **IT3000Ex does not contain any customer servicable parts!**
IT3000Ex may only be installed, adjusted and serviced by qualified personnel!

Ex **The weighing terminal may only be opened when all power to the unit is disconnected.**

Ex **Immediately disconnect defective units from all power sources. Only qualified service personnel (see chapter 6.1), authorized by SysTec GmbH, may carry out repair work with genuine factory supplied spare parts, or serious risks for the user may evolve.**

If any problem arises, please follow this check list:

- Disconnect the weighing terminal from all power sources.
- Check whether all cables including cable glands show any damages.
- Check whether housing and keyboard overlay are undamaged.

If operational difficulties are encountered that cannot be rectified by means of this manual, obtain as much information as possible regarding the particular trouble.

Ex **Fault finding must not be carried out as long as any potentially explosive atmosphere can be present.**
If possible, try first to determine the conditions under which the problem occurs. Try to find out whether the appearance of the difficulties can be reproduced under the same conditions.

For the systematic analysis of an unknown problem the information as listed below is required:

- Serial-No. of the unit and its peripheral components.
- Exact wording of any error message displayed.
- Type and model of peripheral devices related to the problem (e.g. scale, printer, etc.)

To obtain professional assistance contact your service station stating the information listed above.

26.1 Error Messages

If an error occurs during calibration or normal operation, error messages are displayed as follows:

Error Message	Possible Cause	Corrective Measure
During calibration:		
Calibration Locked	• Jumper for protection of calibration parameters in position 'protected'	• Set calibration jumper to calibration position *)
Error Calibr. Jumper	• Parameters cannot be saved, jumper in wrong position	• Set jumper to correct position, repeat calibration *)
Error ADC TIMEOUT	• No data received from A/D converter • Short circuit in L/C cable	• Replace A/D converter *) • Check cabling *)
Error ADC OVERRANGE	A/D converter out of range, because: • Wiring error in L/C connection • L/C defective	 • Check cabling *) • Check L/C *)
Resolution Error	• Internal resolution too small, must be at least tenfold the displayed resolution	• Select bigger increment size *) • Use L/C with lower capacity *)
During normal operation:		
ADC Error	• No data from A/D converter • Short circuit in loadcell cable	• Replace A/D-converter *) • Check cabling *)
ADC Over	A/D converter overrange: • Wiring error loadcell • Loadcell defective • Scale heavily overloaded	 • Check wiring *) • Check loadcell *) • Unload scale

*) Any such action may only be carried out by qualified personnel, authorized by SysTec GmbH.

Error Message	Possible Cause	Corrective Measure
W1 --------	• Scale in overload • CPU does not receive data from weighing interface	• Unload scale • Check internal and external wiring and cabling *)
Power Up Zero Over	• Error power up zero. This message appears on power up if the weight on the scale exceeds the power up zero range as set in the calibration (+2%, +10%).	• Unload scale
Power Up Zero Under	• Weight below power up zero range. This message appears on power up if the weight on the scale is below the power up zero range as set in the calibration (–2%, –10%).	• Apply dead load
Motion	• This message appears on power up if the scale is in motion and a stable weight reading cannot be obtained within the power up zero range as set in the calibration (±2%, ±10%).	• Settle scale
P1 8520 kg	Program stops in the step 'Printing', because:	
	• Printer not ready	• Switch printer on
	• Paper out	• Provide paper
	• RTS/CTS enabled and no reply from printer	• Rectify cause of the problem, if not possible switch terminal off and on again and disable printer in Supervisor Mode

*) Any such action may only be carried out by qualified personnel, authorized by SysTec GmbH.

Error Message	Possible Cause	Corrective Measure
Error Transmission	• Host switched off or off-line, data cable not connected or damaged	• Check cable and connectors *) • Press ↵ -key to repeat transmission • Press F8-key to abort transmission
Load Factory Scale 1	• Factory calibration data lost	• Call service *)
Load Cal Par Scale 1	• Calibration data lost	• Call service *)
Load.Serv.Para	• Service Mode data lost	• Press F1-key to reload factory settings *)

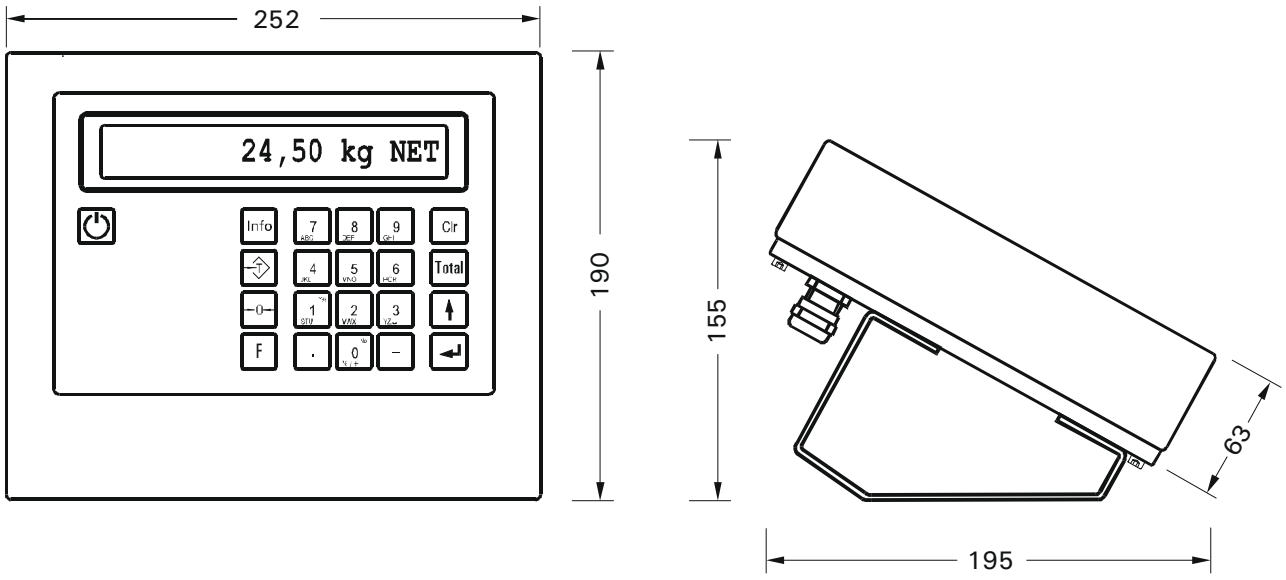
*) Any such action may only be carried out by qualified personnel, authorized by SysTec GmbH

27 Technical Data

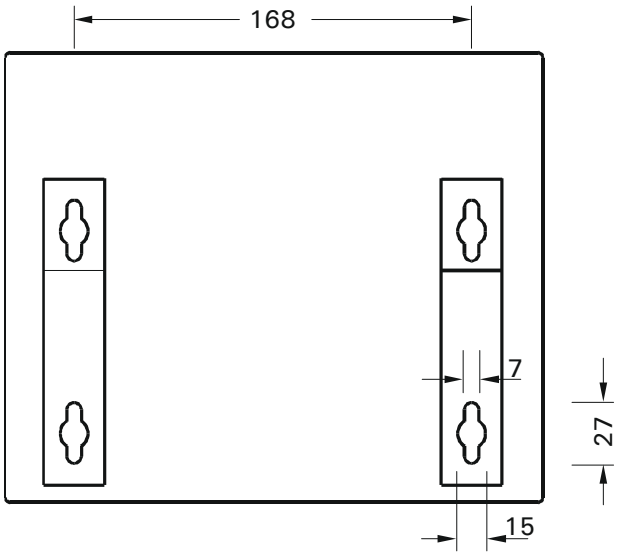
Housing		Stainless steel wall-mount / desk-top or panel-mount housing
IP Rating		IP65
Weight		approx. 3.4 kg
Temperature Range		Storage: –10 °C to +50 °C at 95 % max. relative humidity without condensation Operation: –10 °C to +40 °C at 95 % max. relative humidity without condensation
Surface Temperature		125°C max. in the case of a failure 50°C max. during normal operation
Electrical Connections		see chapter 'definition of safety-relevant electrical values'
Display		Back-lit LCD display, 20 characters, height 14mm, 5x7 dot matrix
Keyboard		Membrane keyboard with tactile feedback, 21 keys incl. numeric keypad, On/Off key, scale keys and function keys, entry of alpha characters via multiple key assignment
Options		Scale interface ADM-Exi, art.-No. E3OPT100
		Serial interface module SIM-10mA-Exi, art.-No. E3OPT221
External Power Supply Units	**IT3000Ex-24VDC**	Power supply unit 230VAC/24VDC for use in Ex zone 1, 2, 21 and 22 article-No. E3OPT903 -EU
		Power supply unit 230VAC/24VDC for use in safe area, article-No. E3OPT901 or E3OPT902-EU, respectively
		Equivalent power supply unit 230VAC/24VDC as per following specification: • SELV in compliance with EN60950 • Output current limited to 10A max. • Um = 253V, max DC/AC voltage in compliance with EN60079-11:2007 section 3.16. • Power supply unit incorporated in metal housing (observe instructions on equipotential bonding, see chapter 'Equipotential Bonding'). • If this power supply unit is installed in hazardous area, it must comply with the required Ex type of protection. • Connecting cables from the power supply unit to the weighing terminal must be shielded. The shield must be connected on both sides. Only use suitable cable in compliance with EN60079-14:2008 section 9.
	IT3000Ex-12VDC	AkkuBox Ex; 12VDC, rechargeable battery with Ex-de connector type miniCLIX, for use in Ex-zone 1 and 2, 21 and 22, art.-No. E3AKK001
		AkkuBox Ex; 12VDC rechargeable battery with Ex-de connector type DXN1, for use in Ex-zone 1 and 2, 21 and 22, art.-No. E3AKK002
		Equivalent 12V rechargeable battery as per following specification: • Um = 14.2VDC, max. DC voltage in compliance with EN60079-11:2007 section 3.16; • Battery incorporated in metal housing Akku eingebaut in Metallgehäuse (observe instructions on equipotential bonding, see chapter 'Equipotential Bonding'); • If the rechargeable battery is installed in hazardous area, it must comply with the required Ex type of protection. • Connecting cables from the rechargeable battery to the weighing terminal must be shielded. The shield must be connected on both sides. Only use suitable cable in compliance with EN60079-14: 2008 section 9.

28 Dimensions

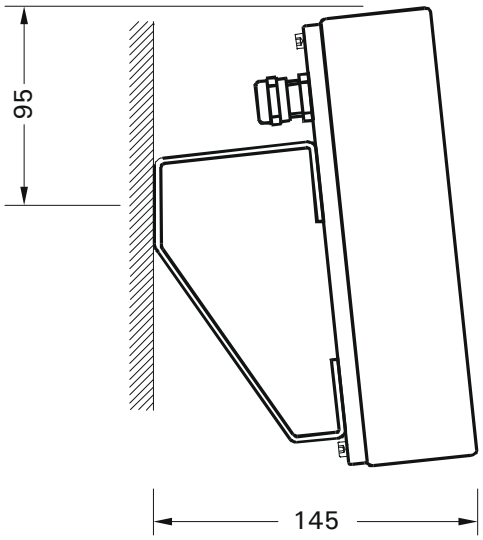
IT3000Ex for desk-top / wall-mount installation:



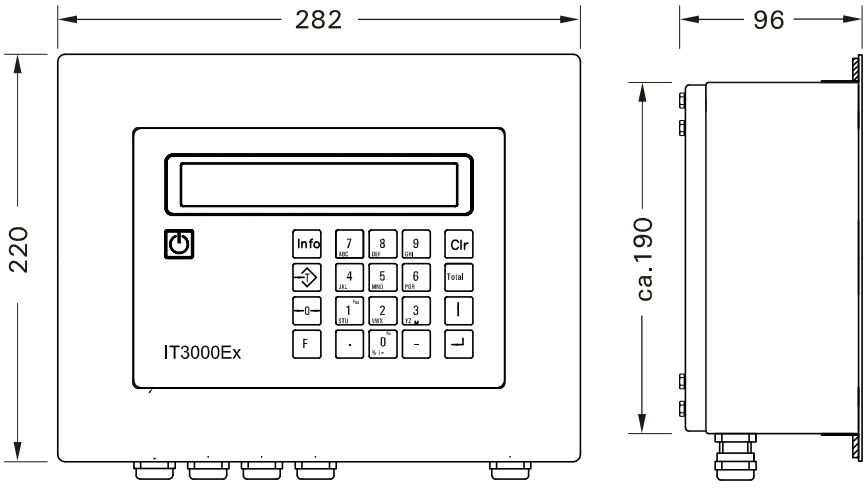
Mounting holes



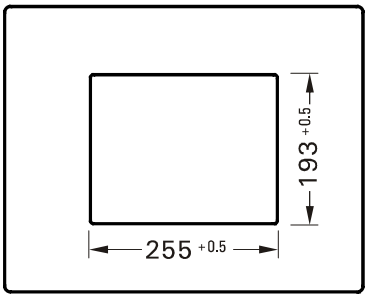
Wall-mount installation



IT3000Ex for panel-mount installation



Cutout in panel



29 Type Examination Certificate TUV

TÜV CERT

TÜV

TÜV Rheinland Group

(1) **EC-TYPE-EXAMINATION CERTIFICATE**

(2) Equipment and Protective Systems intended for Use in Potentially Explosive Atmosphere - Directive 94/9/EC

(3) EC-Type-Examination Certificate Number

TÜV 05 ATEX 7230 X

(4) **Equipment:** **IT3000Ex-24VDC**

(5) **Manufacturer:** **Systec Systemtechnik und Industrieautomation GmbH**

(6) **Address:** **Ludwig Erhard Straße 6**
D - 50129 Bergheim-Glessen

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents referred to.

(8) The TÜV CERT-Zertifizierungsstelle for ex-protected products of TÜV Industrie Service GmbH, TÜV Rheinland Group, Notified Body No. 0035 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially eyplosive atmosphere, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report 194 /Ex 230. 00 / 05

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with

EN 60079-0: 2004	**EN 50020: 2002**
EN 60079-18: 2004	**EN 60079-7: 2003**
prEN 61241-0: 2004	**EN 61241-1: 2004**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type-examination Certificate relates only to the design and construction of the specified equipment in accordance with Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of this equipment.

(12) The marking of the equipment shall include the following:

Ex II 2 (2) G	**Ex e mb ib [ib] IIC T4 ;**
II 2 (2) D	**Ex tD A21 IP 65 T50°C**

TÜV CERT-Zertifizierungsstelle für Explosionsschutz Cologne, 2005-12-13

Dipl.-Ing. Heinz Farke

0035

EC-type-examination Certificates without signation and stamp shall not be valid.
This EC-Type-Examination Certificate may only be reproduced in its entirety and without change.
Extracts or alternations are subject to the
TÜV Cert-Zertifizierungsstelle für Ex-Schutz-Produkte
TÜV Industrie Service GmbH TÜV Rheinland Group Am Grauen Stein 51105 Köln
Tel. +49 (0) 221 806-0 Fax. + 49 (0) 221 806 114

TÜV Rheinland Group

(13) Annex to

(14) # EC Type Test Certificate
TÜV 05 Atex 7230 X

(15) Description of Devices

15.1 Article

The device IT3000Ex-24VDC is an electronic weighing terminal with additional functions for registration, data transmission, counting items and shutdown.

It is an explosion-proof device for use in hazardous areas of zones 1, 2, 21 and 22.

15.2 Description

The weighing terminal IT3000Ex-24VDC may be used in Ex zones 1, 2, 21 and 22. It is powered by a separate, external power supply with a rated voltage of 24 VDC.
Two intrinsically safe, on-board digital inputs and outputs each are provided as standard equipment.
A plug-in module ADM-Exi can be installed for the connection of any type of analogue scale substation.
An intrinsically safe serial interface can be realised with the auxiliary module SIM-10mA-Exi.

Screw-type terminals are provided for all external connections.

The weight and supplementary information are indicated on a 20-digit liquid crystal display with LED back-lighting.
The device is operated with a short-stroke keyboard with a numeric keypad and function buttons.

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15.3 Parameters

15.3.1 Type of Protection Marking

Ex II 2 (2) G	Ex e mb ib [ib] IIC T4
II 2 (2) D	Ex tD A21 IP 65 T50°C

15.3.2 Type of Enclosure Protection

IP 65 in accordance with EN 60529

15.3.3 Ambient Temperature Range

-10°C to +40 °C

15.3.4 Maximum Surface Temperature of Enclosure

+50 °C

15.3.5 Electrical Specifications

15.3.5.1 External Non-intrinsically Safe Electric Circuits of Protection Type Ex e

Supply voltage

Rated voltage	24VDC (+10% / -15%)
Power consumption	4.0 W
Max working voltage Um	253V

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15.3.5.2 External Intrinsically Safe Electric Circuits of Protection Type Ex i

Total of 2 digital inputs (one common intrinsically safe electric circuit)	Uo: 6.51V
	Io: 13.2mA; total
	Po: 21.4mW; total
	Co: 3.4µF; total
	Lo: 200µH, total
Total of 2 digital outputs (one common intrinsically safe electric circuit)	Uo: 6.51V
	Io: 137.1mA; total
	Po: 223.1mW; total
	Co: 3.1µF; total
	Lo: 200µH, total
Serial interface (SIM-10mA)	Uo: 6.51V
	Io: 39.8mA
	Po: 64.8mW
	Co: 1.9µF
	Lo: 2mH
Scale connection (ADM-Exi)	Uo: 6.51V
	Io: 285mA
	Po: 950mW
	Co: 98.3nF
	Lo:130.5µH

(16) Test Report Number No.: 194 / Ex 230.00 / 05

(17) Special Conditions

The enclosure must be protected against permanent UV radiation.

In order to prevent equalising currents from the shielding of connecting cables, the weighing terminal and connected components must be installed within a common potential equalisation system.

(18) Essential Safety and Health Requirements

Fulfilled

TÜV CERT-Zertifizierungsstelle

Cologne, 17 February 2006

Dipl.-Ing. Heinz Farke

Notified body ATEX TÜV Industrie Service 0035

TÜV CERT

TÜV Rheinland Group

1st Supplement

in accordance with directive 94/9/EC, Appendix III, No. 6

to EC Type Test Certificate TÜV 05 Atex 7230 X

Devices:	**Weighing terminals IT3000Ex-24VDC and IT3000Ex-12VDC**
Manufacturer:	**Systec Systemtechnik und Industrieautomation GmbH**
Address:	**Ludwig Erhard Straße 6 in D - 50129 Bergheim-Glessen**

Description of Supplements and Amendments:

The original version of the weighing terminal with an input voltage of 24 VDC was expanded to a 12 VDC version for connection to a 12V battery power supply, which must be certified separately.
The rated voltage of the power supply is reflected in the extension of the type designation. Altogether, therefore, the types IT3000Ex-24VDC and the new model IT3000Ex-12VDC are available.

The devices were also optimised internally. These enhancements, which did not result in any changes for the user, are described in the test report appended to this 1st Supplement.

TÜV CERT

TÜV

TÜV Rheinland Group

Technical Data

Ambient temperature range: -10°C <= Ta <= +40°C
Maximum surface temperature: +50°C

Electrical Specifications:

External non-intrinsically safe terminals of protection type Ex e for supplying power to the intrinsically safe electric circuits:

Device	Supply Voltage:	Power Consumption
IT3000Ex-24VDC	24 VDC +10 / -15 %	4 Watt
IT3000Ex-12VDC	U_N :10.8 – 14.2 VDC	3.5 Watt
	U_m: 14.2 V	

External intrinsically safe connections of protection type Ex i:

The parameters of type IT3000Ex-24VDC of EC type test
TÜV 05 Atex 7230 X were retained and apply for all types mentioned.

Test Report Number No.: 194 / Ex 230.01 / 05

Requirements/Conditions for Reliable Use and Remarks on Use

The original EC Type Test Certificate TÜV 05 Atex 7230 X must be observed.

TÜV-CERT-Zertifizierungsstelle für Explosionsschutz Cologne, 1 March 2006

Dipl.-Ing. Heinz Farke

Notified Body TÜV Industrie Service 0035

TÜV CERT

TÜV

TÜV Rheinland Group

2nd Supplement

in accordance with directive 94/9/EC, Appendix III, No. 6

to EU Type Test Certificate TÜV 05 ATEX 7230 X

Devices:	**Weighing terminal: IT3000Ex-12VDC; IT3000Ex-24VDC and IT3000Ex-230VAC**
Manufacturer:	**Systec Systemtechnik und Industrieautomation GmbH**
Address:	**Ludwig Erhard Straße 6, D - 50129 Bergheim-Glessen**

Description of Supplements and Amendments:

The original versions of the weighing terminal with an input voltage of 24 VDC or 12 VDC were expanded to include a 230 VAC model.

The rated voltage of the power supply is reflected in the extension of the type designation. Altogether, therefore, the types IT3000Ex-12VDC, IT3000Ex-24VDC and the new model IT3000Ex-230VAC are available.

The technical handbook, which was generally revised, has been amended specifically in respect to the possible connections.

Additional equipment optimisations, which are described in the test report appended to this 2nd Supplement, were made inside. These, however, do not result in any changes for the user.

TÜV CERT TÜV TÜV Rheinland Group

Technical Data

Ambient temperature range: -10 °C <= Ta <= +40 °C
Maximum surface temperature: +50°C

Electrical Specifications:

External non-intrinsically safe connections of protection type Ex-e for supplying power to the intrinsically safe electric circuits:

Device	Supply Voltage	Power Consumption
IT3000Ex-230VAC	110-230 VAC +10 / -15 % / 47-63 Hz	4.5 Watt
	Um: 253 V	
IT3000Ex-24VDC	24 VDC +10 / -15 %	4 Watt
	Um: 253 V	
IT3000Ex-12VDC	UN: 10.8 – 14.2 VDC	3.5 Watt
	Um: 14.2 V	

External intrinsically safe connections of protection type Ex i:

The parameters of type IT3000Ex-24VDC of EC type test TÜV 05 Atex 7230 X were retained and apply for all types mentioned.

Test Report No.: 194 / Ex 230.02 / 06

Requirements/conditions for the reliable use and remarks on use

The original EC Type Test Certificate TÜV 05 Atex 7230 X must be observed.

TÜV - CERT - Zertifizierungsstelle für Explosionsschutz Cologne, 31 May 2006

Dipl.-Ing. Heinz Farke

ATEX Notified body • TÜV Industrie Service • 0035

TÜV CERT

TÜV Rheinland Group

3rd Supplement

in accordance with directive 94/9/EC, Appendix III, No. 6

to EU Type Test Certificate TÜV 05 ATEX 7230 X

Devices: **Weighing terminal: IT3000Ex-12VDC; IT3000Ex-24VDC and IT3000Ex-230VAC**

Manufacturer: **Systec Systemtechnik und Industrieautomation GmbH**

Address: **Ludwig Erhard Straße 6, D - 50129 Bergheim-Glessen**

Description of Supplements and Amendments:
The equipments of series IT3000 Ex are electronic weighing terminals with additional functions for the registration, data transmission, piece counting and shuttoff, which are suitable for the use in zone 1,2 21 and 22.

An EC-type-examination was performed in december 2005 under the number TÜV 05 ATEX 7230 X. In the year 2006 the 1st and 2nd supplement were published

Description of Supplements and Amendments:

1. In additon to the existing wall/table-enclosure variant a new built-in variant was developed. Besides the dimensions and the thereout resulting adaptations all safety relevant parameters remain unchanged.
2. Specification of the connection parameters of the Ex-e connection of the power supply
3. Assessment of the equipments due to the current standards of EN 60079 series.
4. Modified components and redesign of the board CPU 3000Exi.
5. Additional insolating tube for the flat flexible cable at the board CPU 3000Exi.
6. The sealed plastic film key board for the IT 3000EX will be fitted with a longer connecting cable.
7. The power supply connection cables of IT3000Ex-24VDC / -12VDC were modified due to the new built-in variant.
8. Adaptation of the internal potential earth cable due to the specified connection parameters of the Ex-e clamps.
9. Marking: Implementation of the following variants: wall/table-enclosure and built-in variant and adaptation of requirements of the standards

Technical Data

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Precisely Right.

The technical datas remain unchanged versus the original certificate and the 1th and 2nd supplement. The relevant standards regarding the original certificate and the 1th and 2nd supplement have been changed partly. This 3rd supplement covers the new assessment of the equipments with reference to the following relevant standards: EN 60079-0: 2006; EN 60079-7: 2007; EN 60079-11: 2007.

Test report No.: 194 / Ex 230.03 / 08

Requirements/conditions for the reliable use and remarks on use

- The build-in variant is suitable for the installation in normal cabinets. The installation in explosion protected enclosures requires special consideration.
- The weighing terminal may not be installed in areas, where very high electrostatic charging is possible, which may produce propagating brush discharges at the front panel. Comment: According to the common knowledge the use and cleaning of the equipment don't produce such a high surface charge density.

The original EC Type Test Certificate TÜV 05 Atex 7230 X as well as the 1th and 2nd supplement must be observed.

TÜV - CERT - Zertifizierungsstelle für Explosionsschutz

Cologne, 13 October 2008

ATEX Notified body 0035 TÜV Rheinland Industrie Service

Dipl.-Ing. Klaus Wettingfeld

4th Supplement

acc. to directive 94/9/EC, Appendix III, No 6

to the EC - Type Examination Certificate

TÜV 05 ATEX 7230 X

Devices:	**Weighing terminal: IT3000Ex-12VDC; IT3000Ex-24VDC and IT3000Ex-230VAC**
Manufacturer:	**Systec Systemtechnik und Industrieautomation GmbH**
Address:	**Ludwig Erhard Straße 6, D - 50129 Bergheim-Glessen**

Description of Supplements and Amendments:
The equipment of series IT3000 Ex are electronic weighing terminals with additional functions for the registration, data transmission, piece counting and shuttoff, which are suitable for the use in zone 1,2 21 and 22.

An EC-type-examination was performed in December 2005 under the number TÜV 05 ATEX 7230 X. In the year 2006 the 1st and 2nd and in year 2008 3rd supplement were published.

Description of Supplements and Amendments:

The equipment was reviewed based on the new standards:

IEC 60079-0: 2011; EN 60079-7: 2007; EN 60079-11: 2012; EN 60079-18: 2009
EN 60079-31: 2009

Based on the updated standards the marking of the equipment was renewed.

TÜVRheinland®
Precisely Right.

Technical Data

The technical datas remain unchanged versus the original certificate and the 1th, 2nd and 3rd supplement.

Marking

Schutzartkennzeichen
Code for type of protection

⟨Ex⟩	**II 2 (2) G**	**Ex e ib mb [ib] IIC T4 Gb**
⟨Ex⟩	**II 2 (2) D**	**Ex ib tb [ib] IIIC T125°C Db IP65**

Test report No.: 557 / Ex 230.04 / 12

Requirements/conditions for the reliable use and remarks on use

- The build-in variant is suitable for the installation in normal cabinets. The installation in explosion protected enclosures requires special consideration.
- The weighing terminal may not be installed in areas, where very high electrostatic charging is possible, which may produce propagating brush discharges at the front panel. Comment: According to the common knowledge the use and cleaning of the equipment don't produce such a high surface charge density.

The original EC Type Test Certificate TÜV 05 ATEX 7230 X as well as the 1th, 2nd and 3rd supplement must be observed.

TÜV Rheinland - Zertifizierungsstelle für Explosionsschutz Cologne, 25 June 2012

TÜVRheinland® Notified Body

Dipl.-Ing. Klauspeter Graff

30 System Description IT3000Ex

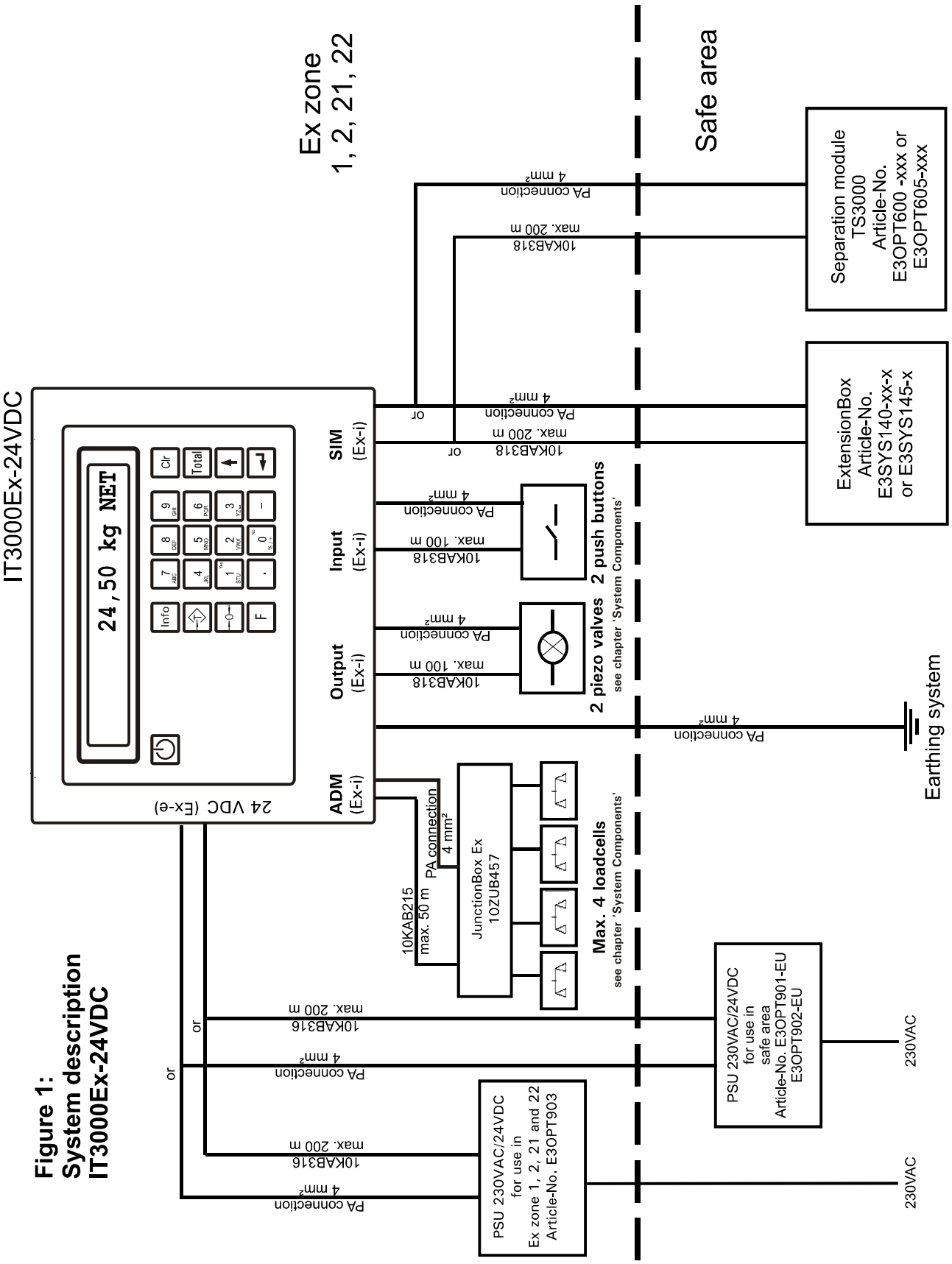

Figure 1:
System description
IT3000Ex-24VDC

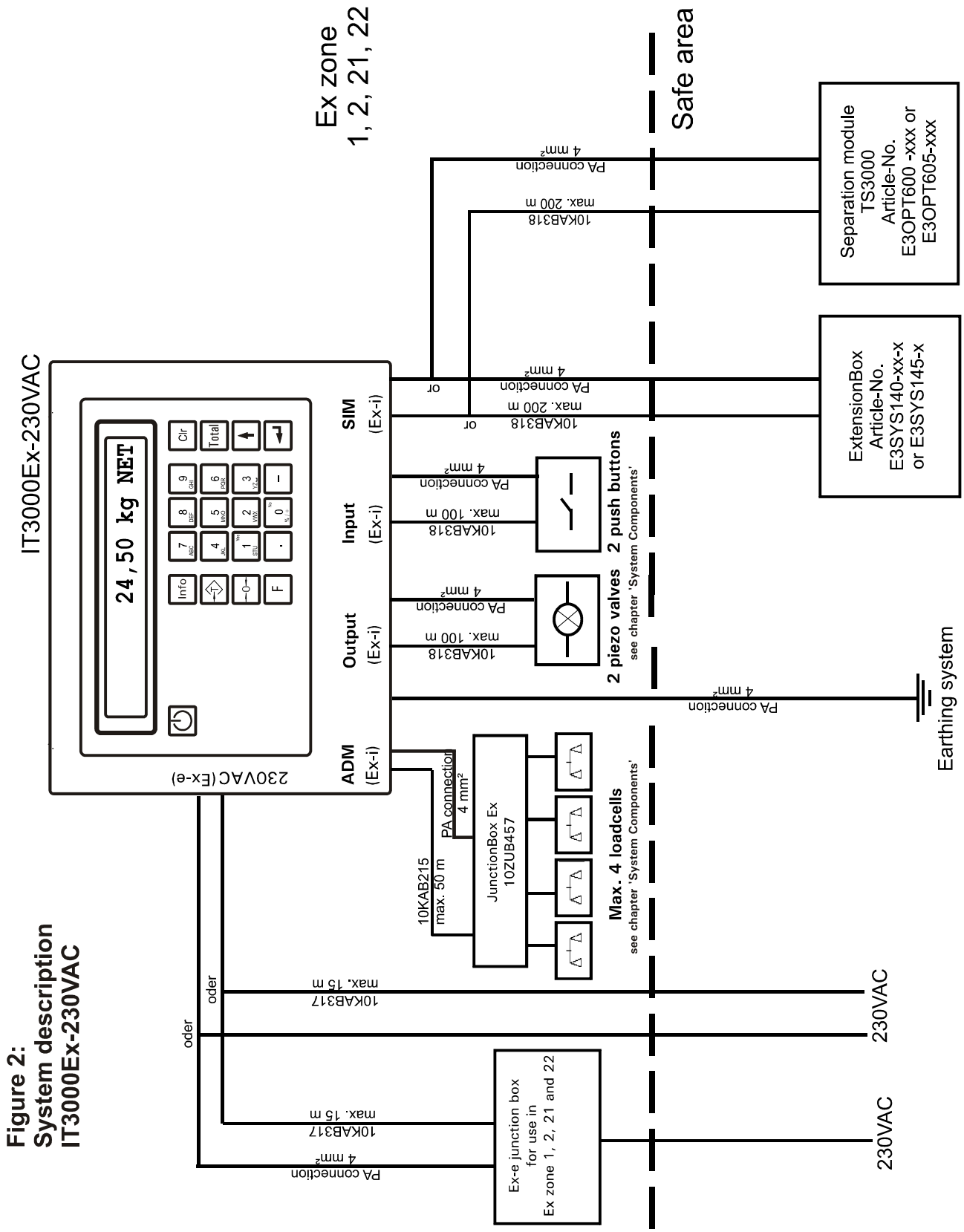

Figure 2:
System description
IT3000Ex-230VAC

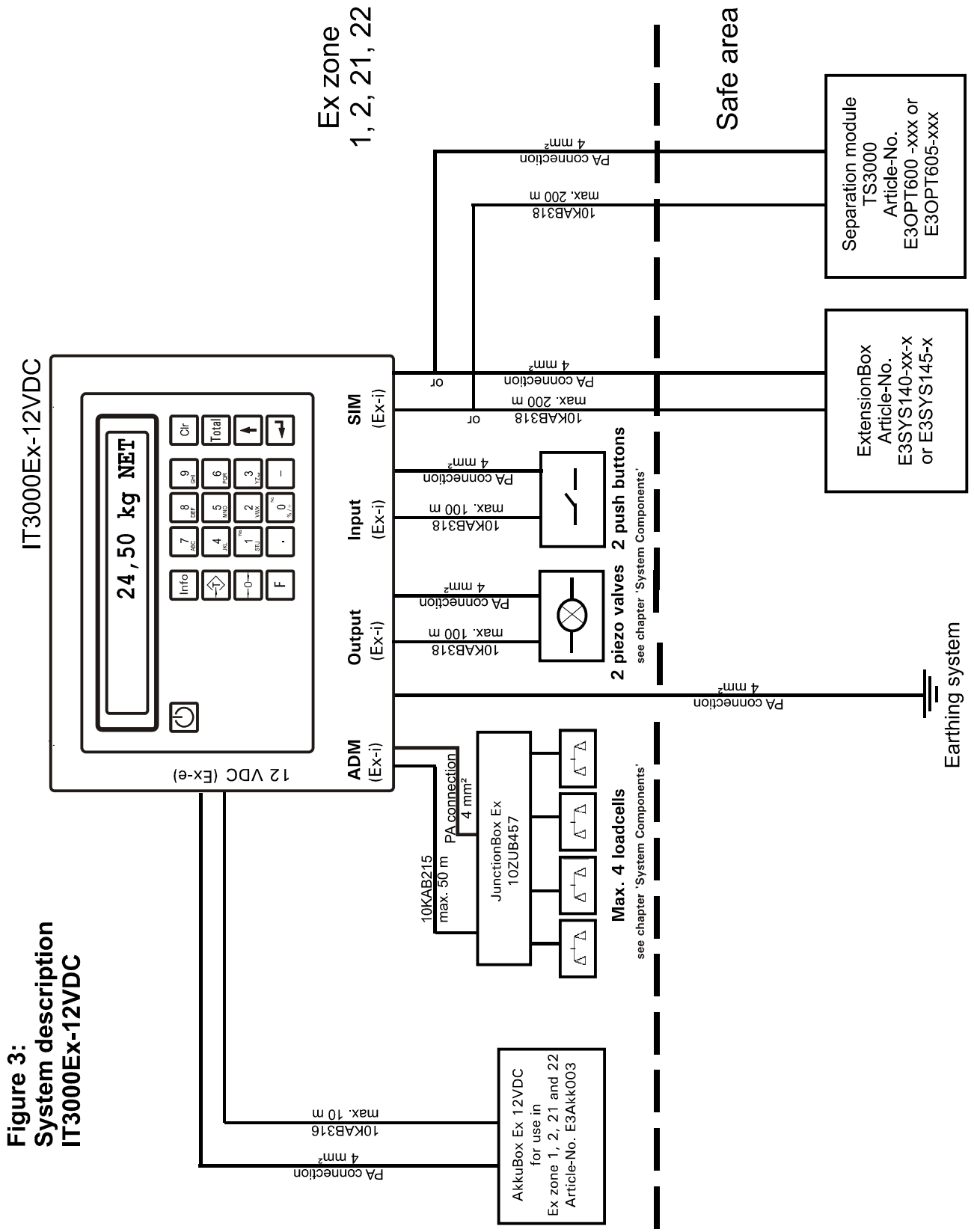

Figure 3:
System description
IT3000Ex-12VDC

30.1 System Description

The figures 1, 2 and 3 each show a typical system configuration with the IT3000Ex weighing terminal. The system has the following safety-relevant values:

Temperature class	T4
Group	IIC
Range of ambient temperature	–10°C ... +40°C

It consists of the following components with the max. permissible cable lengths as specified:

Weighing terminal IT3000Ex	Connected components	Type of cable	Length
Power supply circuit IT3000Ex-24VDC, Ex-e	1 x power supply unit Siemens LOGO!Power 24V SELV as per EN60950	Oelflex 540 CP 2 x 1.0 mm²	**200 m**
Power supply circuit IT3000Ex-230VAC, Ex-e	1 x Ex-e junction box	Oelflex 540 CP 3 x 1.0 mm²	**2,5 m**
Power supply circuit IT3000Ex-12VDC, Ex-e	1 x AkkuBox Ex 12VDC	Oelflex 540 CP 2 x 1.0 mm²	**10 m**
Inputs CPU3000Exi, IN0 - IN1	2 x switches Moeller RMQ22	Unitronic EB JE- LiYCY.BD 2x2x0.5 mm²	**100 m**
Outputs CPU3000Exi, OUT0 - OUT1	2 x Ex-i piezoelectric valves Hoerbiger P8-385RF-NG-SPT67	Unitronic EB JE- LiYCY.BD 2x2x0.5 mm²	**50 m**
Weighing module ADM-Exi	4 x Ex-i loadcells HBM C16	Kerpen Kabel KSv2YCYFL 4 x AWG20/7 + 2 x 1.0 mm²	**100 m**
Schnittstellenmodul SIM10mA-Exi	1 x Ex separation module SysTec TS3000	Unitronic EB JE- LiYCY.BD 2x2x0.5 mm²	**200 m**

Installation must be carried out in compliance with EN60079-14 and/or EN61241-14. Also, all country-specific regulations at the place of installtion must be observed.

As shown in the examples and in compliance with EN6079-14 and/or EN61241-14 all components must be integrated into the equipotential bonding system of the installation.

The bonding conductor must have a cross section of min. 4mm².

Alternatively to the components listed above, also the components listed in the following section 'System Components' may be used. If other components or other cables with less favorable characteristics are used, the documented evidence of intrinsic safety must be rendered anew.

30.2 System Components

30.2.1 Weighing Terminal

Designation	SysTec article-No.	EC type approval certificate	Ex-i interfaces	Uo (V)	Io (mA)	Po (mW)	Co (μF)	Lo (μH)
IT3000EX-230VAC	E3SYS001-xxx	TÜV 05 ATEX 7230 X	ADM-Exi	6.51	285	950	0.0983	130.5
IT3000EX-24VDC	E3SYS005-xxx	TÜV 05 ATEX 7230 X	SIM10mAExi	6.51	39.8	6.8	1.9	2000
			2 digital inputs total	6.51	13.2	21.4	3.4	200
IT3000EX-12VDC	E3SYS006-xxx		2 digital outputs total	6.51	137.1	223.1	3.1	200

30.2.2 Power Supply Units

for weighing terminal	Designation	SysTec article-no.	EC type approval certificate	Type of protection
IT3000EX-24VDC	PSU 230V/24VDC for use in safe area	E3OPT901-xx E3OPT902-xx	–	–
	PSU 230V/24VDC Typ CCA-0 for use in Ex zone	E3OPT903	KEMA 03 ATEX 2045 LCIE 97 ATEX 6006 X	Flame proof enclosure Ex-d
IT3000EX-12VDC	AkkuBox Ex with miniCLIX socket, Typ SLB 12, for use in Ex zone	E3AKK001	EPS 10 ATEX 1 241 X	II 2G Ex eb mb IIC T6 II 2D Ex tb IIIC T80°C
	AkkuBox Ex with DXN1 socket, Typ Ex 12V A512 SI / 16 G5, for use in Ex zone	E3AKK002	BVS 07 ATEX E 065 X	II 2G Ex e mb II T5 II 2D Ex tD A21 T90°C

30.2.3 Separation Module TS3000 Or ExtensionBox With Ex Separation Module TS10mAEx

Designation	SysTec article-No.	EC type approval certificate	Ex-i interface	Ui (V)	Ii (mA)	Pi (mW)	Ci (nF)	Li (μH)
TS3000	E3OPT60x-xxx	TUV 05 ATEX 7231 X	TS10mAEx	-	50	100	0	0
ExtensionBox	E3SYS14x-xxx	TUV 05 ATEX 7231 X	TS10mAEx	-	50	100	0	0

30.2.4 Ex-i Loadcell Junction Box

Designation	SysTec article-No.	EC type approval certificate	Ui/Uo	Ii/Io	Pi/Po	Ci	Li
EEx i shift adjust junction box type 10ZUB456	10ZUB456	SEV 04 ATEX 0115	# 20V	# 400mA	# 1.3W	0	0
JunctionBox Ex	10ZUB457	TÜV 12 ATEX 7258	# 20V	# 400mA	# 1.3W	0	0

30.2.5 Pushbuttons/Switches

The pushbuttons and/or switches are considered as 'simple apparatus' and must comply with the requirements of EN60079-11:2007 section 5.7.

In compliance with the requirements as above, the switching element must meet the values as specified below:

$U_N > 6,51$

$I_N > 13,2mA$

$P_N > 21,4mW$

$Ci = 0$

$Li = 0$

30.2.6 Ex-i Piezoelectric Valves

Manufacturer	Type	EC type approval certificate	Ui (V)	Ii (mA)	Pi (W)	Ci (nF)	Li (μH)
Hoerbiger	P8 385RF-NG-SPT67	DMT 01 ATEX E 026 X	9	–	–	12	–

30.2.7 Ex-i Loadcells

Manufacturer	Type of loadcell	EC type approval certificate	Ui (V)	Ii (mA)	Pi (W)	Ci (nF)	Li (μH)
Flintec GmbH	PCB, PC2, PC6, SB2, SB4, SB6, SB14, RC1, RC2, RC3, UB1, UB6	KEMA 02 ATEX 1123 X	17	500	2.1	~0	~0
	PC1, SB5, SLB	KEMA 02 ATEX 1123 X	17	500	2.1	~0	~0
Revere Transducers Europe B.V.	SHBxR, BSP, CSP-M, CP-M, HPS, SSB, HCB, 9102,5103, 9103, RLC with max. 25m cable (RLC with capacity 60kg, 130kg, 28t, 60t not permitted)	KEMA 00 ATEX 1132 X	19,1	323	2.75	0.4	~0
Hottinger Baldwin Messtechnik GmbH	C16, C2, U2, PW with max. 10m cable	PTB 01 ATEX 2208 and 1. amendment	22	469	1.25	1.62	6
Avery Berkel Ltd	T109	DEMKO 01 ATEX 129328 X	24	400	1.3	0.32	1.5
	T110	DEMKO 01 ATEX 129328 X	24	400	1.3	0.504	2.28
	T203; T204	DEMKO 01 ATEX 129328 X	24	400	1.3	1.3	6

30.2.8 Connecting Cables

IT3000Ex-xx interface	Cable SysTec article-No.	Construction	Outer diameter	Color of cable jacket
Loadcells (ADM-Exi)	10KAB215	KSv2YCYFL 4 x AWG20/7 + 2 x 1.0mm² shielded flame retardant	10.0 mm	blue
Digital inputs (CPU3000Exi) Digital outputs (CPU3000Exi) Serial interface (SIM10mAExi)	10KAB318	JE-LiYCY 2 x 2 x 0.5 mm² twisted pair shielded flame retardant	7.5 mm	blue
24VDC power supply (Ex-e) 12VDC power supply (Ex-e)	10KAB316	flexible PUR cable 2 x 1.0 mm² shielded flame retardant	9.6 mm	yellow
230VAC power supply	10KAB317	flexible PUR cable 2 x 1.0 mm² shielded flame retardant	10 mm	yellow

W A R N I N G
It is mandatory to repeat the procedure of rendering recorded evidence of intrinsic safety if other components are used or if safety-relevant data of a component have changed, e.g. through an amendment of an existing approval. Thus, it is required to verify the accuracy and validity of these safety-relevant data.