HORN TECALEMIT

Tank truck management system 2084

Installations instructions (MID)

Translation of the original operating manual GB

Important!

The operating manual is always to be read before commissioning the equipment. No warranty claim will be granted for faults and damage to the equipment arising from insufficient knowledge of the operating manual.

Copyright

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Content

1. General safety remarks and connection diagrams TWM 2084

1.2.1. General SafetyRemarks

General remark

The precautionary measures described in this manual inform you about the necessary care during the installation and commissioning of the TWM 2084 and the necessary measures to avoid any risks.

Precautionary measures are first of all to your own safety. At the same time, they also prevent uninvolved people from eventual injuries and ensure a reliable operation of the system

Operating manual

Do not execute any work regarding commissioning or installation not described in this manual.
Please contact the manufacturer if anything in this manual is not clear.

1.2.2. Explanation to the Safety Symbols

The installation manual makes use of the following symbols:

Warning – Describes aapossible dangerous situation. If not followed, death orse-riousunjuries as well as material defect can occur.

Dangerous electrical voltage – Describes danger by electric shock. If not followed, death or serious injuries as well as material defect can occur.

Caution – Describes a possible dangerous situation. If not followed, minor injuries or material defect can occur.

Electrostatic endangered components – Means that touching the contact surface can lead to the destruction of electronic components. Under regular circumstances, people and material may carry a static voltage of a few thousand volts.

Important information – Describes hints for the use and other very important information.

Requirements – Describes conditions that need to be met or components that need to be present in order to successfully finalise an operation.

1.2.3. Basic Security Measures

Protection and safety devices

Protection and safety devices are to be controlled at regular intervals and must not be bridged or by-passed

Dismantled safety and security devices have to be:

- Re-mounted before re-commissioning
- controlled for their functionality

Safety devices must be placed well visibly and be reached easily (emergency-stop-switch, fire fighting devices).

1.2.4. Legal Bases

Gerneral safety remarks

Following generally valid safety regulations, knowledge and behaviours are presupposed and are not separately specified:

VDE - Regulations (Germany)

EMC - Rules

UVV - Rules for the prevention of accidents (Germany)

VdTÜV - Instruction card 651 „Electrical mechanisms of gas stations “(Germany)

TRbF - Technical rules for combustible liquids (Germany)

GefStoffV - Dangerous material regulation (Germany)

VbF - Regulation of combustible liquids (Germany)

Country specific Guidelines and regulations

Please consider the regulations and guidelines which are valid in other countries. Personal protection equipment is to be used if required or demanded by law.

e1 Symbol

The tank truck management system TWM 2084 is certified for the installation into road vehicles of the force travel Federal Office and correspond to the EMV 95/54/EG guideline.
As special identifier the e1-symbol was assigned.

EMC

The TWM 2084 can also be used in residential, trade and industrial areas and responds to the EMV 89/336/EWG guideline.

CE

The installation remarks described in this manual are to be kept, in particular the necessary grounding measures

For application in explosion hazardous areas the AI-system must be used. The condition of this explosion-proof system is regulated in the current 94/9/EG (ATEX 100a) guideline.

The approval label is made public through the EG type approval (Appendix 13) and can be taken from the type plate on the system.

Consider the special remarks in this manual to comply with this guideline.

Standard conformity

This system corresponds to the standards (in the valid edition)

EN 60079-0
EN 60079-1
EN 60079-11

and is certified for the use in explosion hazardous areas (zones 1 and 2).

Intended use

Use this equipment and its components only for the certified targeted
applications. Incorrect and unintended use as well as the neglect of special
remarks in this manual exclude any guaranty.

1.2.5. Requirements of the Service and Operating Personnel

All persons, who install, set up or do maintenance on the TWM 2084, must be trained or instructed and must have knowledge of the possible risks.

Missing or insufficient knowledge of the installation manual entail a non-liability.

Personnel activity	Installation specialist	Driver
Installation and establishment	■	
Any work on the electrical connection	■	
Operation		■

Tab. 1-1 Personnel requirements

1.2.6. Remarks for Installation and Operation

- The TWM 2084 is to be mounted such that the keyboard is protected against unintended pressure.
- The unit needs to be equipped with blind plugs and wire-conductors that are approved according to 94/9/EG, EN 60079-0 and EN 60079-1.
- All threaded joints for cables are M20.
- The housing must not be opened earlier than 15 minutes after the system has been switched off! Do not open the housing in explosion hazardous atmosphere!

1.2.7. Special Kinds of Dangers in the External Area

Convolution with fuel

Handling fuel requires largest care:

- Avoid direct striking and eye contact
- Avoid to inhale fuel steams. Fuel steams can cause health damage!
- Never use fuel for cleaning
- Keep away ignition sources. Fuel is flammable!

1.2.8. Behaviour in an Emergency Situation

- Separate the system from vehicle power (main switch on OFF)
- Extinguish fires with a class B fire extinguisher

1.2. Technical Data

1.2.1. Electronic Volume Meter (EVM)

Display	Graphical LCD, back-light 240 x 64 dots
Keyboard	Wear-free piezo-keyboard 6 function keys Numbered keyboard with character-input
Interfaces	20 mA current-interface for printer 1 analogue input for temperature sensor 2nd input for double counter unit 4 outputs for magnetic valve control Control of additional valves 20 mA Stromschnittstelle für Drucker CAN-Bus for LRC3
Data-storage	4 years with backup battery

Power supply	24 V DC (min. 18 V, max. 32 V, including over-voltage protection)
Fuse current limit	3,15 A
Environmental temperature	-20° C bis +55° C
Housing protection	IP 54
Dimensions	A I-version: H 300 x W 290 x D 150 mm A III-version: H 280 x W 260 x D 120 mm
Weight	A I-version: 16,9 kg A III-version: 14,4 kg
Attention!	**Open the housing only 15 min. after switching off.** **Screws from the housing cover must be tightened during assembly with a torque of 13-14Nm.**
Weight & Measure Approvals	
Germany **Switzerland** **Austria**	5.543/94.08 ZA 150 OE 95/R 262, OE 95/R 267
Ignition protection	⟨Ex⟩ II 2 G Ex d ib [iaGaibGb] IIB T6 Gb
Type approval certificate no.	SEV 12 ATEX 0102 X
Pulse generator electric circuit NAMUR Plug X1 and X2, Connections 1 to 4	Intrinsically safety according to Ex ib IIC Maximum values for each electric circuit
	U_o=9 V
	I_o= 18 mA
	P_o = 120 mW
	trapezoidal characteristic curve
	C_o =4,9 µF
	L_o= 50 mH
Pulse generator electric circuit Plug X1 and X2, Connections 1 to 4	In the ignition protection intrinsic safety Ex Maximum values for each electric circuit
	U_N=5 V
	I_N= 50 mA
	P_N = 250 mW

1.2.2. Printer TM-U 295

Slip printer	Colour-ribbon printer Paper size B 80 to B 182 mm Paper thickness up to 0,32 mm, corresponds to 3 sheets
Supply voltage	24 V DC (voltage stabiliser to prevent defects due to over-voltage)
Environmental temperature	+ 5° C to + 45° C
Dimensions	H 101 x B 180 x T 190 mm
Weight	2,6 kg (incl. mounting plate)
Weight & Measure	5.543/94.08

1.2.3. Pulse Generator

Impulse ratio	25 pulses/rotation
Rotations	maximum 700 U/min
Power supply	4,5 V to 15 V (+/- 15%)
Current consumption	50 mA
Environmental temperature	- 25 °C to + 70 °C
Protection	IP 65
Phase shift	90° (+/- 30°)

1.2.4. Temperature Sensor

	Temperature sensor AI	**Temperature sensor AIII**
Measurement device	Pt 100 (according to DIN)	Pt 100 (according to DIN)
Installation length	70 mm	70 mm
Thread	G 1/2	G 1/2
Environmental temperature	- 40° C to + 60° C	- 40° C to + 60° C
Accuracy	1/3 DIN B	1/3 DIN B
Ignition protection class	Ⓔx II 1/2 G Ex ia IIC T6	

Type certificate no.	SEV 09 ATEX 0120

1.2.5. Solenoid Valve

Design	Direct acting 3/2-way-seat valves
Pressure range	0 – 10 bar
Temperature range	- 20° C to + 50° C
Power supply	24 V DC

1.2.6. Measuring Chambers, PTB Calibration Symbol

Oval wheel meter with electrical register	5.241/94.49
Sliding vane meter with electrical register	5.243/94.39
Oscillating piston meter with electrical register	5.232/94.32

1.3. Connection possibilities

The following pages contain connection diagrams for:

Electronic Volume Meter (EVM)

- Measuring point A in AIII- filling system
- Measuring point B in AIII- filling system
- Measuring point A in AI- filling system
- Measuring point B in AI- filling system
- Truck-Data-Link standard interface (TDL)

Printer connection box in driver cabin for:

- Printer 2084.72.030.xx
- Printer 2084.72.031.xx
- Printer 2084.72.131.xx
- Printer LQ-570+ with TDL and the corresponding cable configuration
- Two EVM's at one printer

Dosing pump to EVM in AIII-filling system

- Sening
- Blackmer
- Haar

C7/14 (Pulser-Connection) for GMVZ 1004/ GMVT 805/ GMVT 704

- Measuring point A in AIII- filling system
- Measuring point B in AIII- filling system
- Measuring point A in AI- filling system
- Measuring point B in AI- filling system

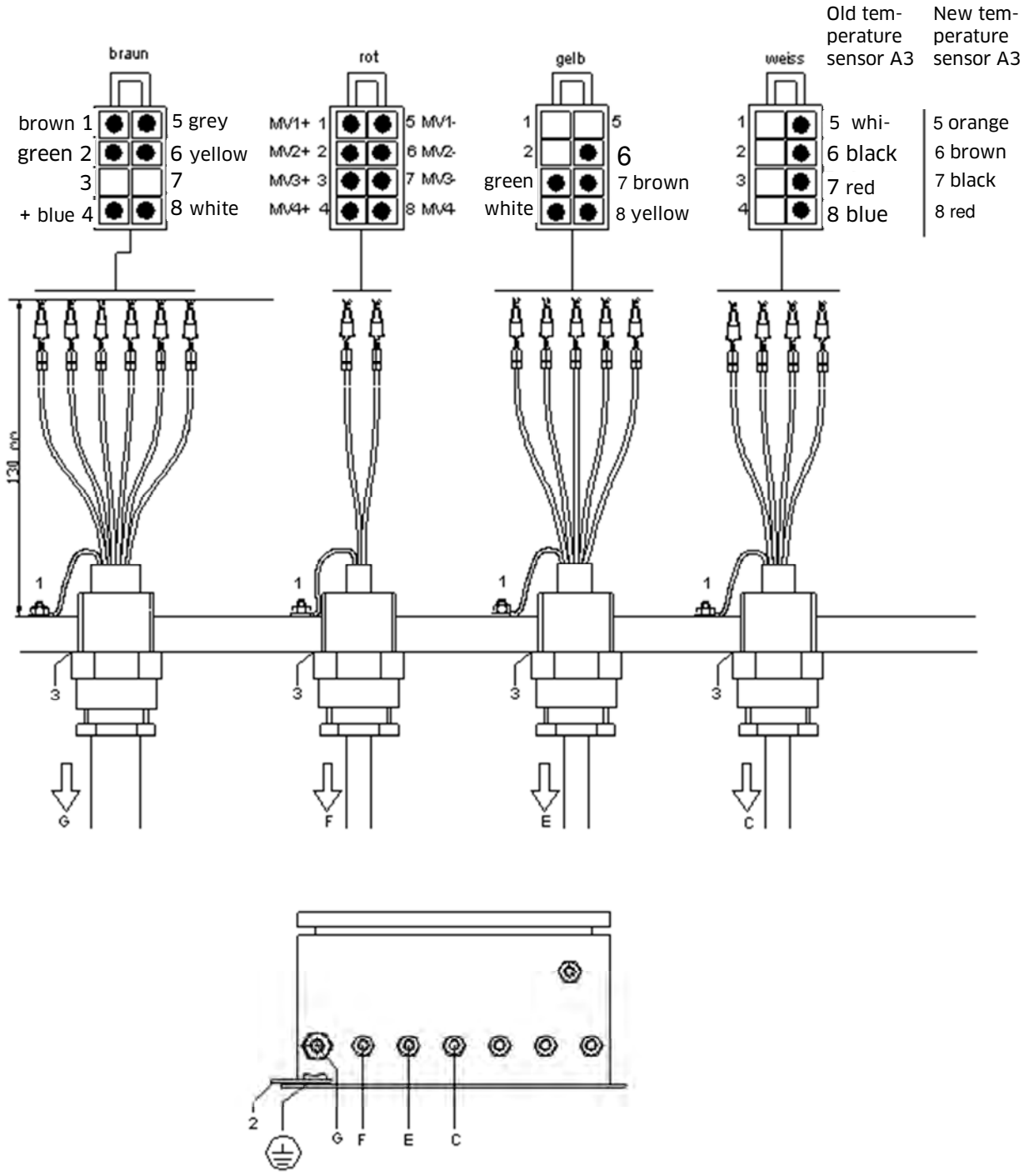
Achtung!

Attention!

Only components permitted by the manufacturer may be installed!

On disregard warranty claims must be rejected.

1.4. Measuring Point A in AIII-Filling System



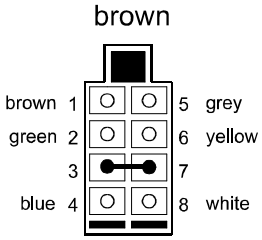
Pos.	Description
C	Temperature sensor 1
E	Pulse generator 1
F	Solenoid valve MV 1 (general release M16)
G	Printer/ electrical system
1	Connection to earth on EVM casing
2	Connection to earth on vehicle chassis
3	CMP-/Ex threaded joints

Note!

All connections to earth (1) must be made using a yellow - green cable with diameter 6 mm^2. The maximum cable length is 50 mm.

The connection to earth (pink) to the vehicle chassis (2) must be ended using a ring terminal.

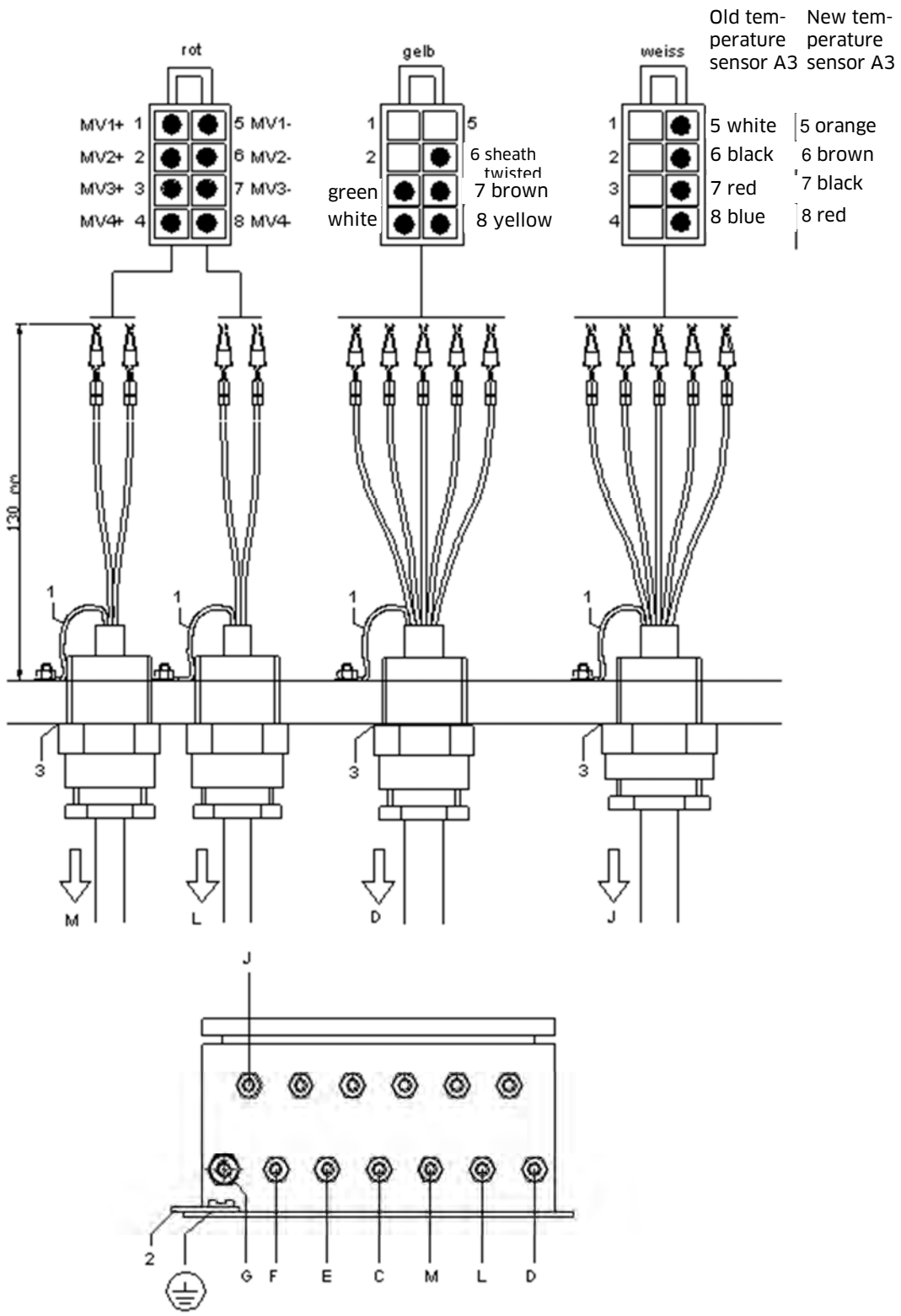
With the EVM 2084.32.100.00 starting from serial no. 734 and EVM 2084.32.200.00 starting from serial no. 295 (double computers) pins 3 and 7 must be bridged.



Applies **only** to standard installation (one EVM and one printer)!

With the installation of two EVM's separated from each other with access to a single printer pins 3 and 7 **must not be** bridged (*no bridge*).

1.5. Measuring Point B in AIII-Filling System



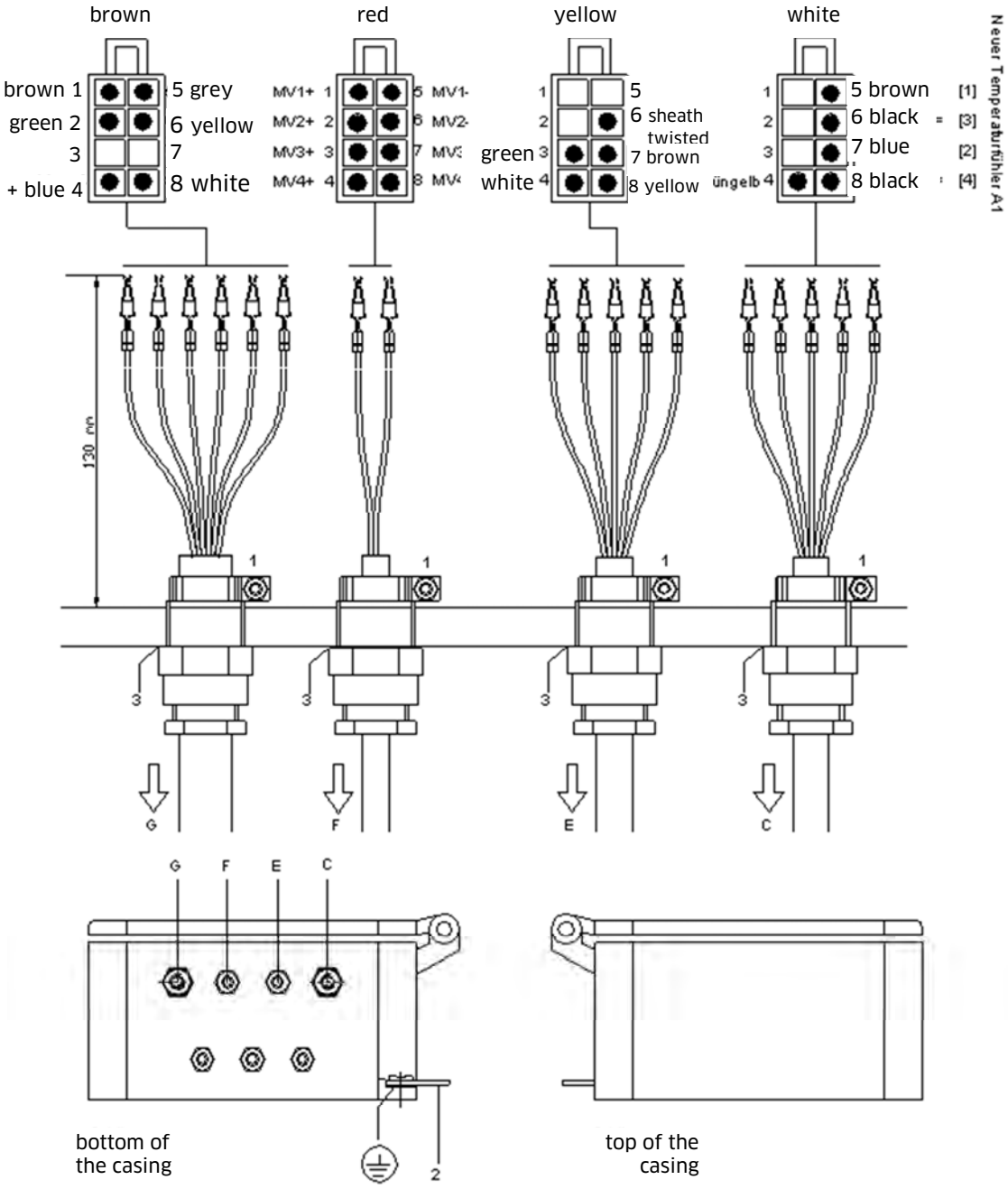
Pos.	Description
J	Temperature sensor 2
D	Pulse generator 2
L	Solenoid valve MV 1 (general release AF2)
M	Solenoid valve MV 2 (pulse release IF2)
1	Connection to earth on EVM casing
2	Connection to earth on vehicle chassis
3	CMP-/Ex threaded joints

Attention!

All connections to earth (1) must be made using a yellow- green cable with diameter 6 mm^2. The maximum cable length is 50 mm.

The connection to earth (pink) to the chassis (2) must be ended using a ring terminal.

1.6. Measuring Point A in AI-Filling System



Illustr. 1-1: Connection plan for measuring point A in AI Filling System

Pos.	Description
C	Temperature sensor 1
E	Pulse generator 1
F	Solenoid valve MV 1 (general release)
G	Printer / electrical system
1	Connection to earth of EVM casing
2	Connection to earth of vehicle chassis
3	CMP-/ Ex threaded joints

WARNING - REGULATION ON HAZARDOUS ENVIRONMENTS!

All connections to earth (1) must be made using a yellow - green flexible cable with diameter 6 mm^2. The maximum cable length is 50 mm. The connection to earth to the chassis (2) must be ended using a ring terminal.

All threaded joints CMP (3), threaded joints subsequently executed and blind plugs must be secured using Loctite 275 or 270. Shielding of the temperature sensor connection cable (4) must be stripped (connection to earth within printer).

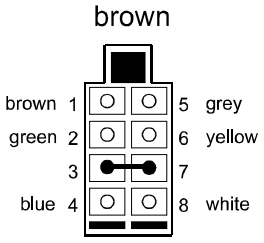
All cables must be fixed adequately to prevent removal or twisting.

Option additive pump:

If the additive pump input line (additive pump controller) is protected, exchange cable input with AF1 to under-wedge the screen at cable clip.

ATTENTION!

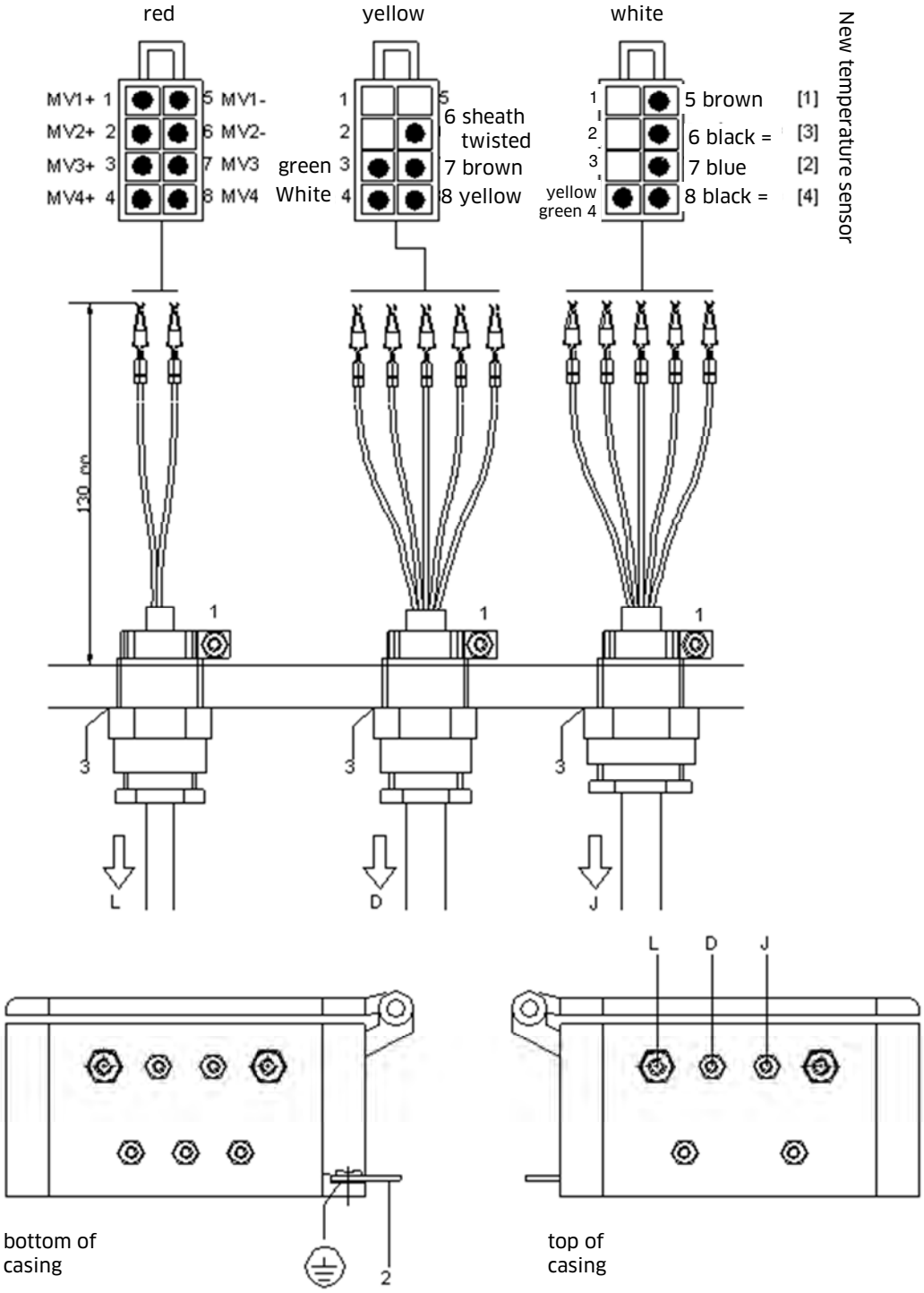
With the EVM 2084.32.100.00 starting from serial no. 734 and EVM
2084.32.200.00 starting from serial no. 295 (double computers) pins 3 and 7 must be bridged.



Applies **only** to standard installations (one EVM and one printer)!

With the installation of two EVM's which are separated from each other but have access to a single printer pins 3 and 7 **must not be** bridged.

1.7. Measuring point B in AI-Filling System



Illustr. 1-2: Connection plan for measuring point B in AI Filling System

Pos.	Description
J	Temperature sensor 2
D	Pulse generator 2
L	Solenoid valve MV 1 (general release 2)
1	Connection to earth of EVM casing
2	Connection to earth of vehicle chassis
3	CMP-/ Ex threaded joints

WARNING – REGULATION ON HAZARDOUS ENVIRONMENTS!

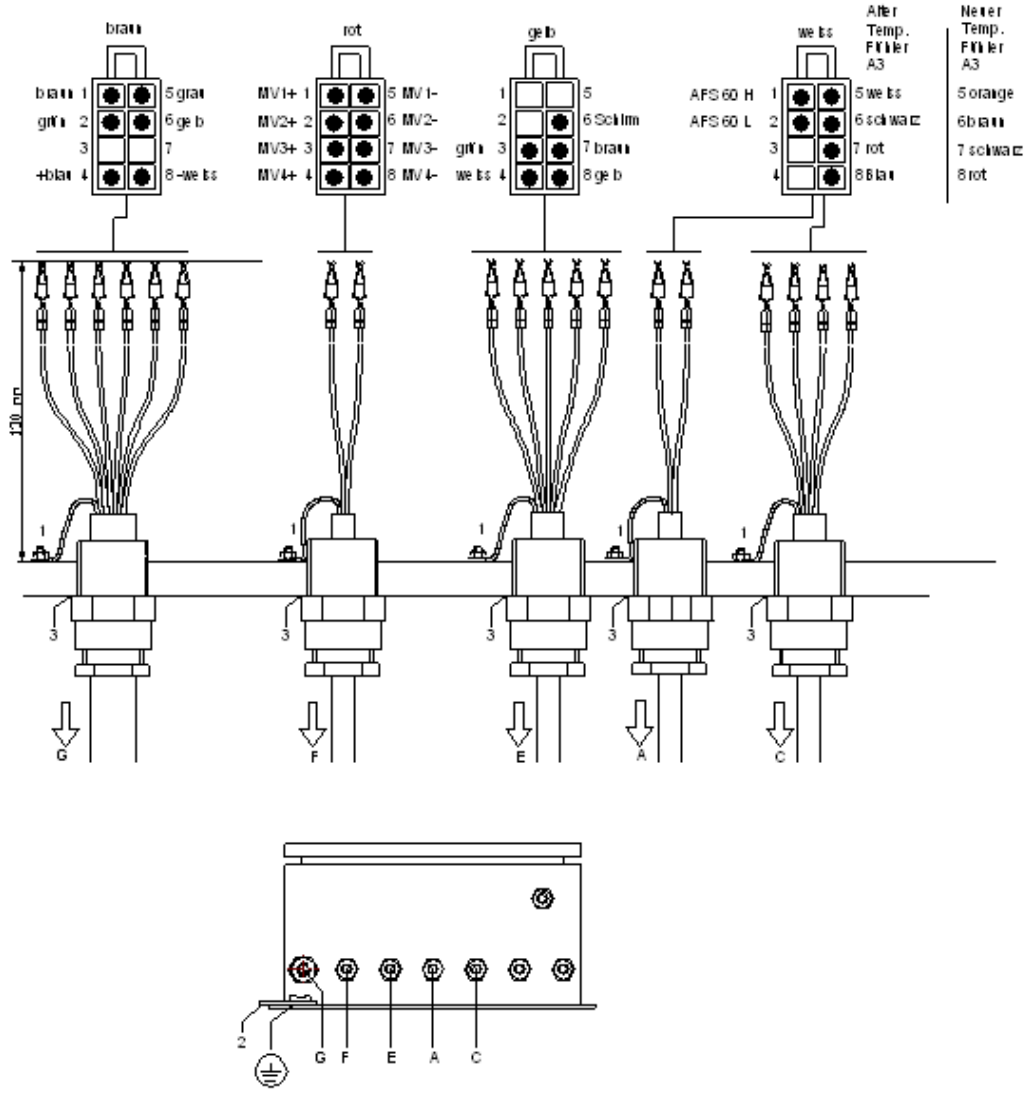
All connections to earth (1) must be made using a yellow - green flexible cable with diameter 6 mm^2. The maximum cable length is 50 mm. The connection to earth to the chassis (2) must be ended using a ring terminal.

All threaded joints CMP (3), threaded joints subsequently executed and blind plugs must be secured using Loctite 275 or 270. Shielding of the temperature sensor connection cable (4) must be stripped (connection to earth within printer).

All cables must be fixed adequately to prevent removal or twisting.

The ground connection (2) does not have to be executed for measuring system B, if measuring system A is connected with the vehicle mass already.

1.8. Measuring Point A in AIII Filling System with AFS 60



Illustr. 1-5: Connection plan for measuring point A in AIII filling system

Pos.	Description
A	CAN BUS AFS60
C	Temperature sensor 1
E	Pulse generator 1
F	Solenoid valve MV 1 (general release 2)
G	Printer / electrical system
1	Connection to earth of EVM casing
2	Connection to earth of vehicle chassis
3	CMP-/ Ex threaded joints

WARNING - REGULATION ON HAZARDOUS ENVIRONMENTS!

All connections to earth (1) must be made using a yellow-green cable with diameter 6 mm^2. The maximum cable length is 50 mm. The connection to earth to the chassis (2) must be ended using a ring terminal.

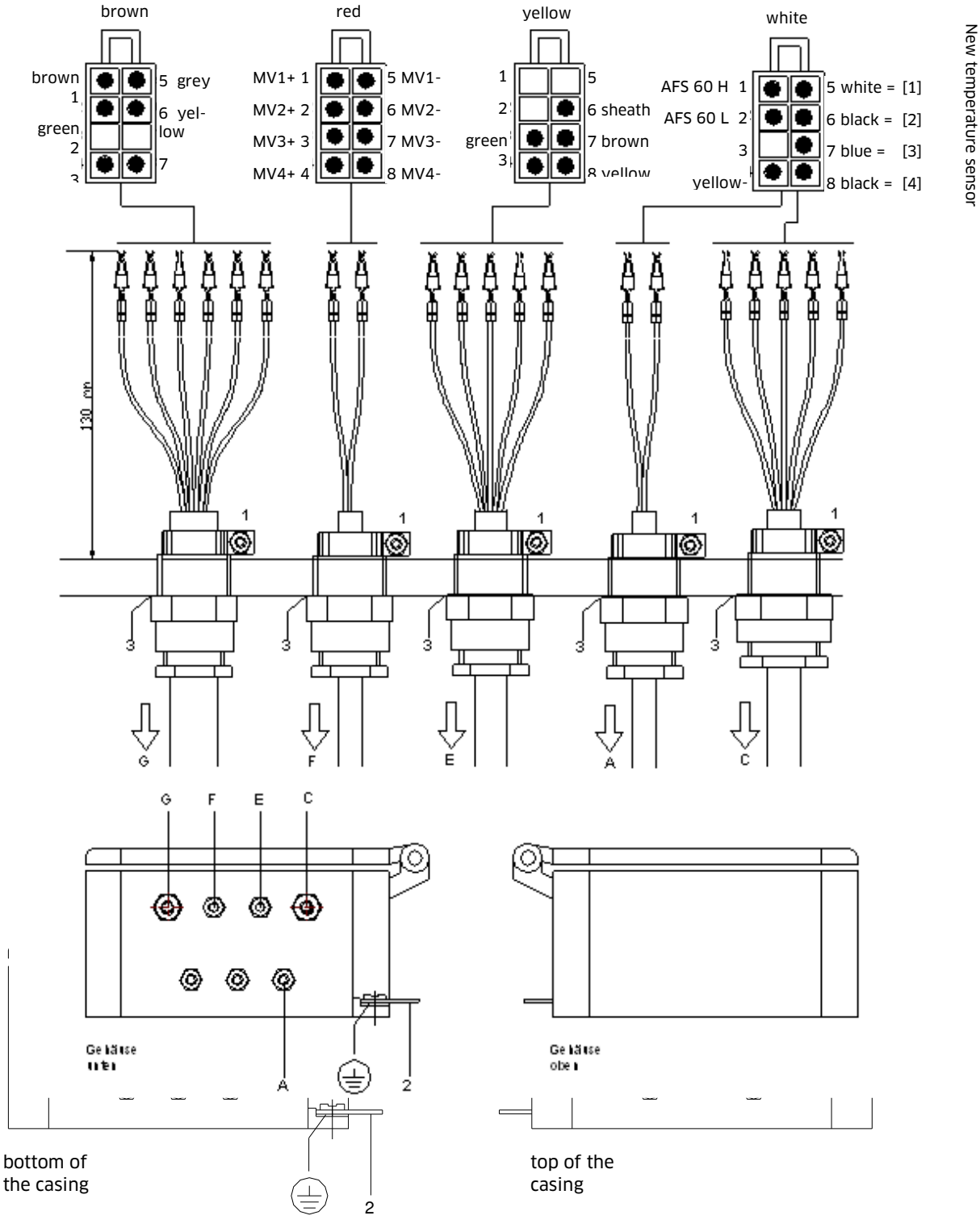
All CMP (3) threaded joints, threaded joints subsequently executed and blind plugs must be secured using Loctite 275 or 270.

Shielding of the temperature sensor connection cable (4) must be stripped (connection to earth within printer).

All cables must be fixed adequately to prevent removal or twisting.

The ground connection (2) does not have to be executed for measuring system B, if measuring system A is connected with the vehicle mass already.

1.9. Measuring point A in AI Filling System with AFS 60



Illustr. 1-6 : Connection plan for measuring point A in AI Filling System

Pos.	Description
C	Temperature sensor 1
E	Pulse generator 1
F	Solenoid valve MV 1 (general release 2)
G	Printer / electrical system
1	Connection to earth of EVM casing
2	Connection to earth of vehicle chassis
3	CMP-/ Ex threaded joints

WARNING - REGULATION ON HAZARDOUS ENVIRONMENTS!

All connections to earth (1) must be made using a yellow-green cable with diameter 6 mm^2. The maximum cable length is 50 mm. The connection to earth to the chassis (2) must be ended using a ring terminal.

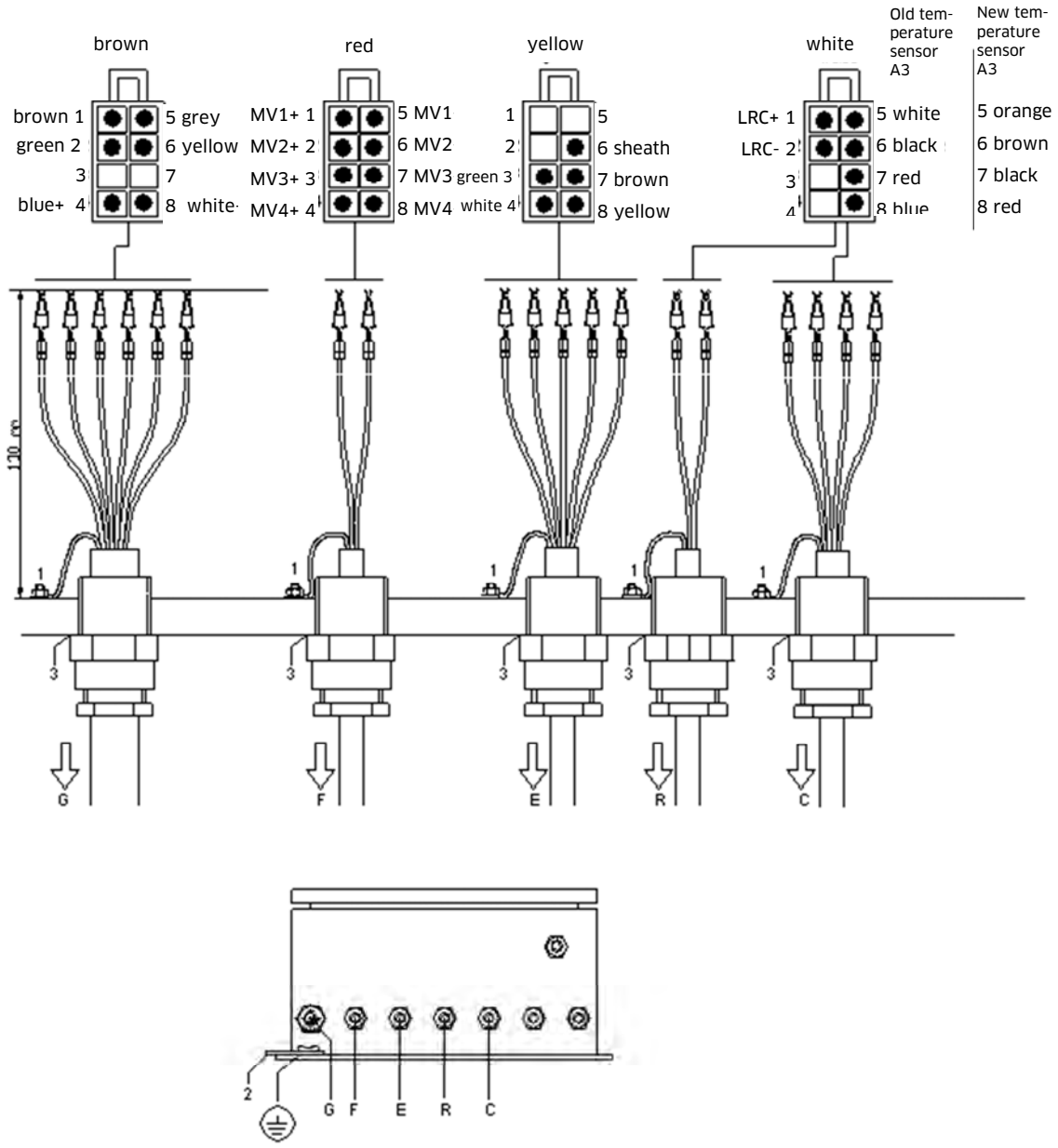
All CMP (3) threaded joints, threaded joints subsequently executed and blind plugs must be secured using Loctite 275 or 270.

Shielding of the temperature sensor connection cable (4) must be stripped (connection to earth within printer).

All cables must be fixed adequately to prevent removal or twisting.

The ground connection (2) does not have to be executed for measuring system B, if measuring system A is connected with the vehicle mass already.

1.10. Measuring Point A in AIII Filling System with LRC



Illustr. 1-7: Connection plan for measuring point A in AIII Filling System with LRC

Pos.	Description
C	Temperature sensor 1
E	Pulse generator 1
R	LRC Connection
F	Solenoid valve MV 1 (general release 2)
G	Printer / electric system
1	Connection to earth of EVM casing
2	Connection to earth of vehicle chassis
3	CMP-/ Ex threaded joints

WARNING - REGULATION ON HAZARDOUS ENVIRONMENTS!

All connections to earth (1) must be made using a yellow-green cable with diameter 6 mm^2. The maximum cable length is 50 mm. The connection to earth to the chassis (2) must be ended using a ring terminal.

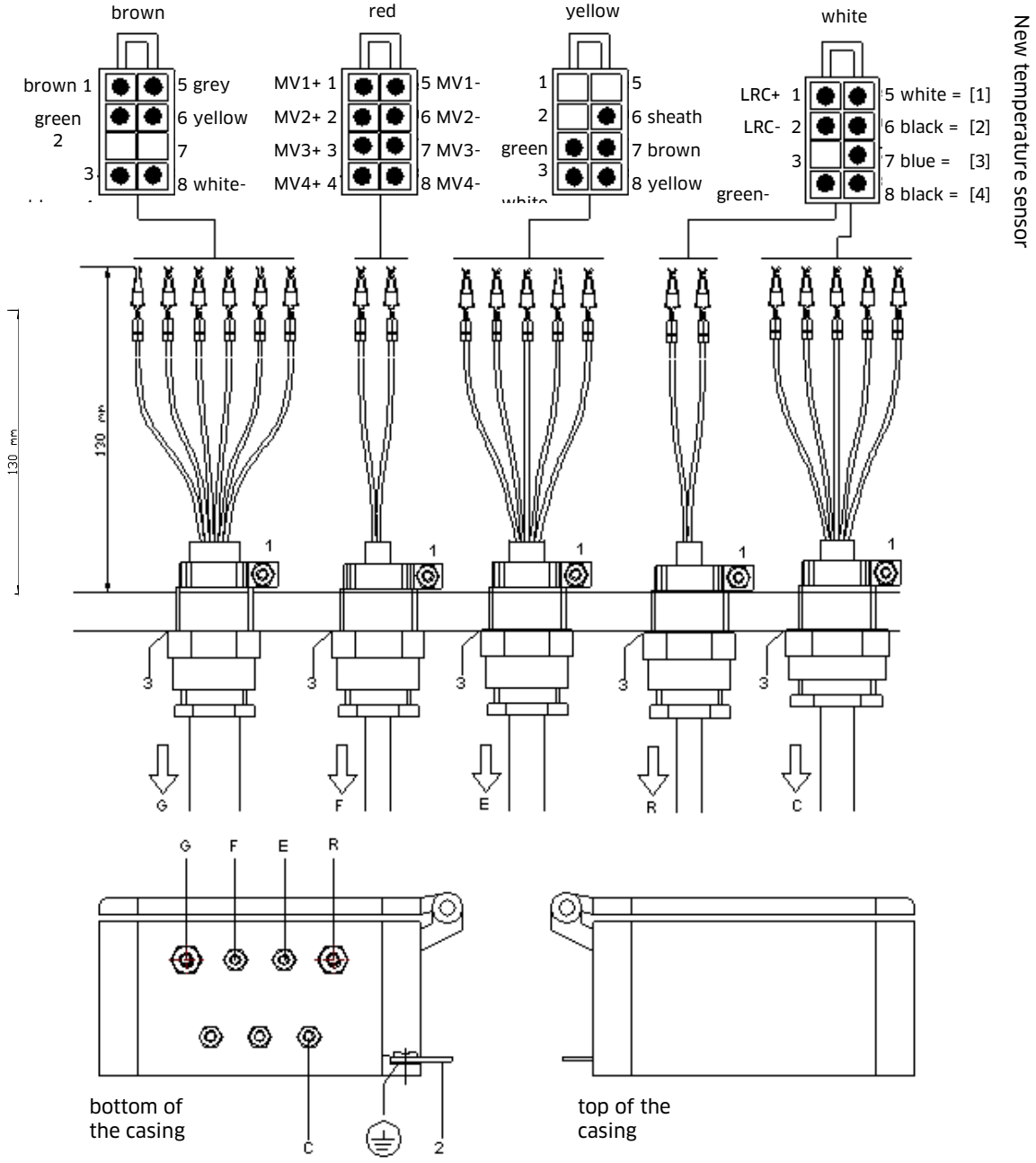
All CMP (3) threaded joints, threaded joints subsequently executed and blind plugs must be secured using Loctite 275 or 270.

Shielding of the temperature sensor connection cable (4) must be stripped (connection to earth within printer).

All cables must be fixed adequately to prevent removal or twisting.

The ground connection (2) does not have to be executed for measuring system B, if measuring system A is connected with the vehicle mass already.

1.11. Measuring Point A in AI Filling System with LRC



Illustr. 1-8: Connection plan for measuring point A in AI Filling System with LRC

Pos.	Description
C	Temperature sensor 1
E	Pulse generator 1
R	LRC connection
F	Solenoid valve MV 1 (general release 2)
G	Printer / electric system
1	Connection to earth of EVM casing
2	Connection to earth of vehicle chassis
3	CMP-/ Ex threaded joints

WARNING - REGULATION ON HAZARDOUS ENVIRONMENTS!

All connections to earth (1) must be made using a yellow-green cable with diameter 6 mm^2. The maximum cable length is 50 mm. The connection to earth to the chassis (2) must be ended using a ring terminal.

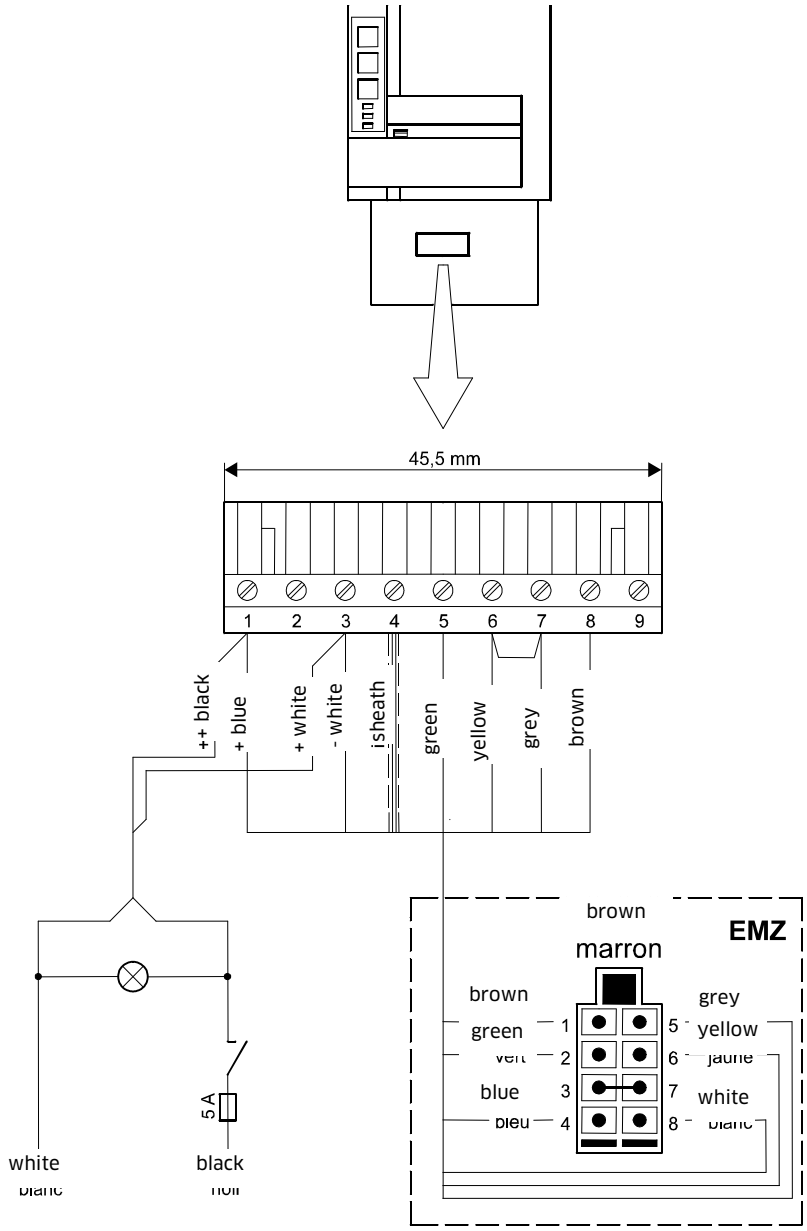
All CMP (3) threaded joints, threaded joints subsequently executed and blind plugs must be secured using Loctite 275 or 270.

Shielding of the temperature sensor connection cable (4) must be stripped (connection to earth within printer).

All cables must be fixed adequately to prevent removal or twisting.

The ground connection (2) does not have to be executed for measuringsystem B, if measuring system A is connected with the vehicle mass already.

1.12 Printer Connection Box 2084.72.030.06 (1st generation)



Illustr. 1-9: Connection plan for printer connection box 2084.72.030.06

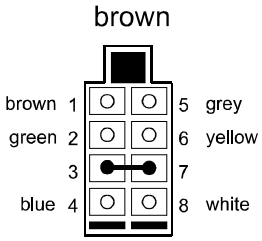
Binder	Cable colour	Assignment
1	black	Plus (+) from the 24 V on-board PSU
2	blue	Plus (+) to EVM
3	white	Minus (-) from the 24 V on-board PSU
4	white	Minus (-) to EVM
5-9		Data line EVM - printer

ATTENTION!

If a printer connection box version 2084.72.030.06 is used in connection with an EVM of the following versions:
-EVM AIII old type serial number < 387
-EVM AI single version < 406
-EVM AI double version < 215
A bridge between clamp 6 (yellow) and clamp 7 (grey) has to be mounted on the 9-pin strip.

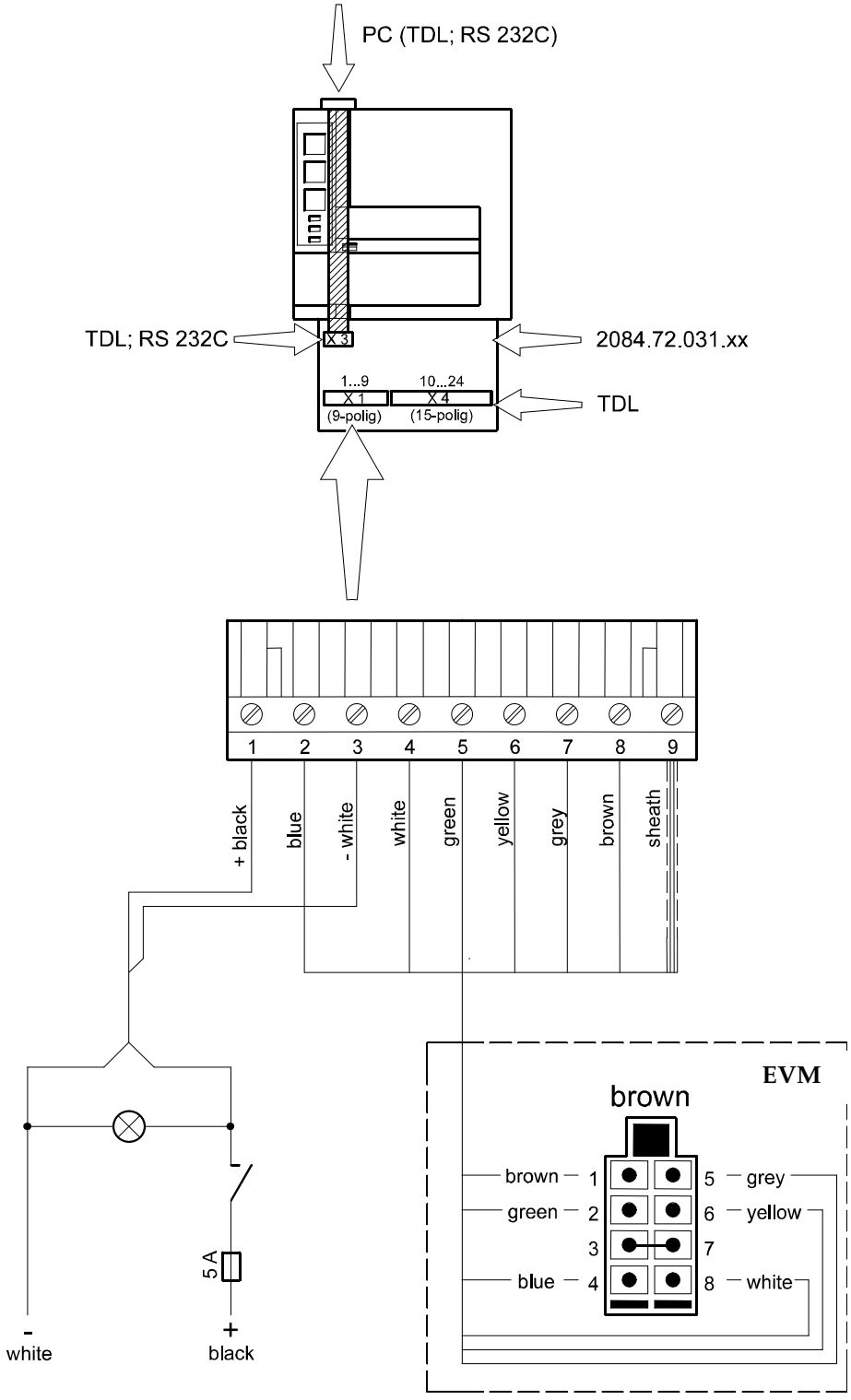
Printer functions will not work without this bridge!

With the EVM 2084.32.100.00 starting from serial no. 734 and EVM 2084.32.200.00 starting from serial no. 295 (double version) pins 3 and 7 must be bridged.



Applies **only** to standard installations (one EVM and one printer)!

1.13 Printer Connection Box 2084.72.031.xx (TDL Standard)



Illustr. 1-10: Connection plan for printer connection box 2084.72.031.xx

Binder	Cable colour	Assignment
1	black	Plus (+) from the 24 V on-board PSU
2	blue	Plus (+) 24 V to EVM
3	white	Minus (-) GND from the 24 V on-board PSU
4	white	Minus (-) GND 24 V to EVM
5-9		Data line EVM - printer

Clamp allocation TDL-RS 232C/ 422/ 485 (X4)

Link for different physical connection types external PC over a 15-pin row "Combicon ".

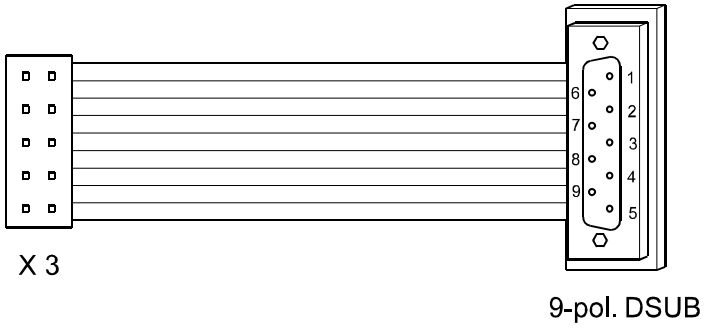
Pin (x4)	Signal	Interface	I/O	
10	RXD	RS232C	out	
11	DSR	RS232C	out	
12	TXD	RS232C	in	
13	RTS	RS232C	in	
14			GND	
15	EN.L	RS485	in	RS422 open
16	TXA	RS422	out	
17	TXB	RS422	out	
18	RXA	RS422	in/ out	RS485 A
19	RXB	RS422	in/ out	RS485 B
20			GND	
21	RXD	TTL	out	
22	DSR	TTL	out	
23	TXD	TTL	in	
24	RTS	TTL	in	

ATTENTION!

Only one of the interfaces RS232C, RS422 or RS485 may be used at a time.

Plug allocation PC-RS232C

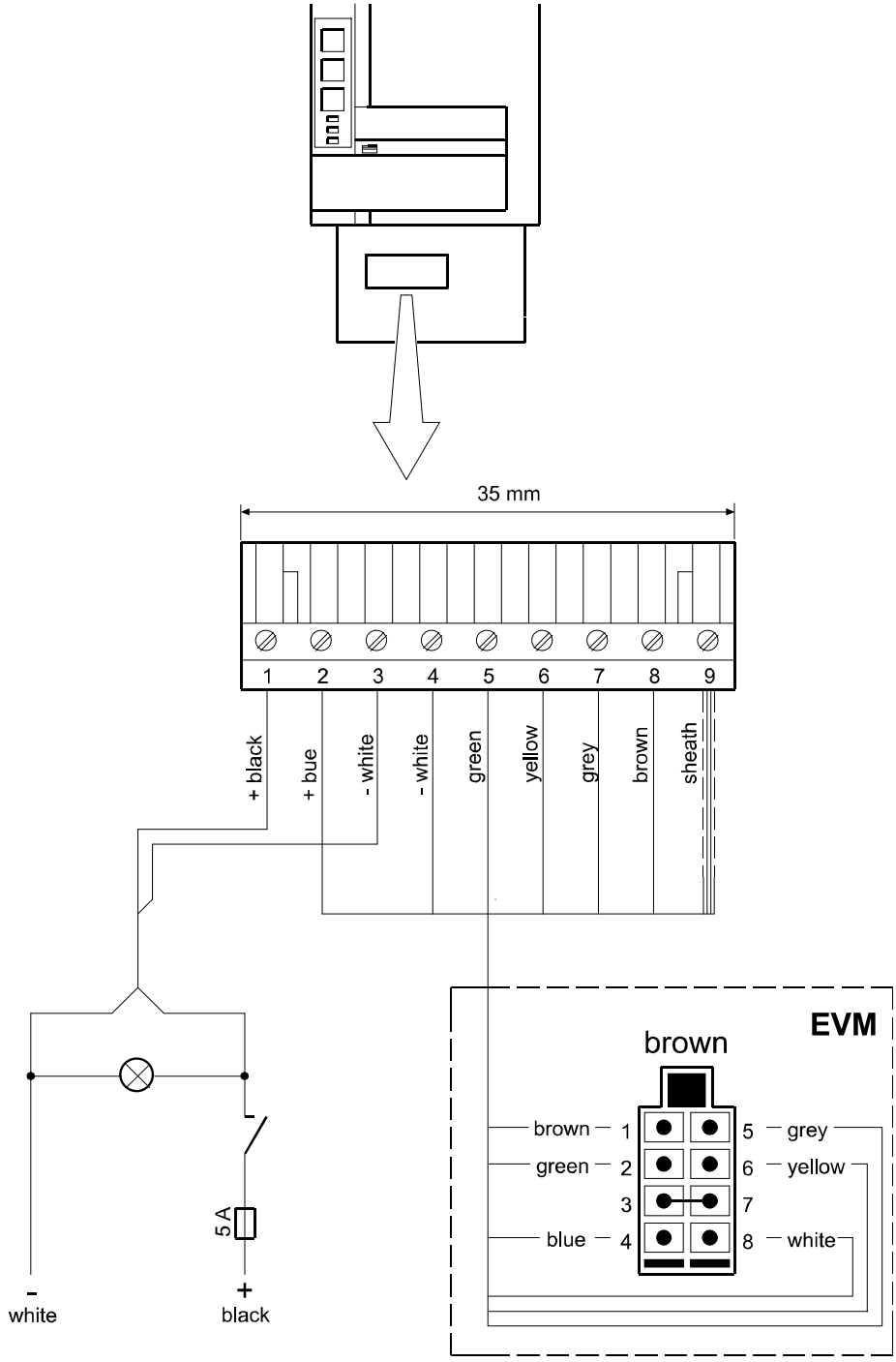
Over a ribbon cable of approx. 250 mm (10-pin row to 9-pin Sub-D connector), an external PC can be connected temporarily (RS232C serial connector).



Illustr. 1-11: Connection Diagram for Printer connection box 2084.72.031.xx

Pin	Signal	I/O
1		Not connected (nc)
2	RXD	out
3	TXD	in
4		Not connected (nc)
5		GND
6	DSR	out
7	RTS	in
8		Not connected (nc)
9		Not connected (nc)

Printer connection box 2084.72.131.xx



Illustr. 1-12: Connection diagram for Printer connection box 2084.72.131.03/ 04/ 11

Binder	Wire colour	Assignment
1	black	Plus (+) from the 24 V on-board PSU
2	blue	Plus (+) to EVM
3	white	Minus (-) from the 24 V on-board PSU
4	white	Minus (-) to EVM
5-9		Data line EVM - printer

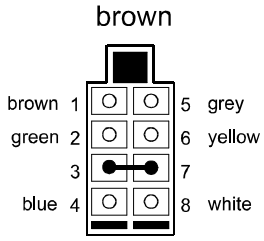
ATTENTION!

If a printer connection box version 2084.72.131.03/04 and 2084.72.131.11 is used in connection with an EVM of the following versions:
-EVM AII old type serial number < 387
-EVM AI single version < 406
-EVM AI double version < 215
A bridge between clamp 6 (yellow) and clamp 7 (grey) has to be mounted on the 9-pin strip.

Printer functions will not work without this bridge!

With the EVM 2084.32.100.00 starting from serial no. 734 and EVM

2084.32.200.00 starting from serial no. 295 (double calculators) pins 3 and 7 must be bridged.



Applies **only** to standard installations (one EVM and one printer)!

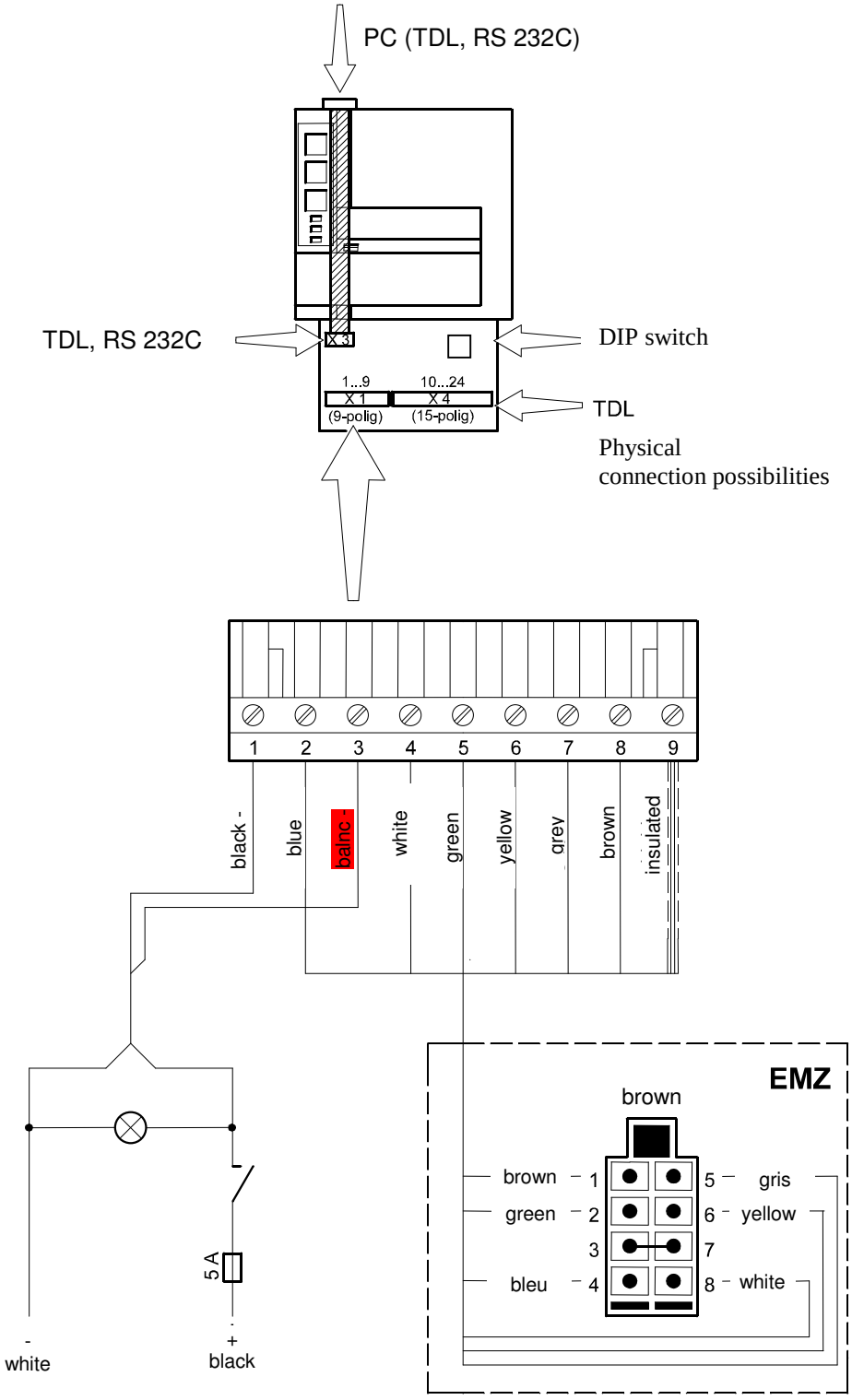
1.14 Printer Dongle 2084.72.031.10

For the TWM service with printers (from version 2084.02.002.01, which do not support the block mode for the transfer of calibrated data, the electronics of the printer control gear have been extended with one additional controller. The controller takes over the relevant calibrated saving of the data (block mode) to the printer. Thereby it transfers transparently non-relevant data to the printer. Relevant data are de-codified and sent to the printer.

On the printout of the calibration parameters the software version of the dongle, the flash control sum and the Baud rate are printed. At the moment of the switch-on of the TWM, these data are also shown on the display.

DIP switch: 4 DIP switches are on the printer control gear circuit board. Two of them (in the dongle software 1.0) are concerned, this means switch 1 and switch 2. At the moment of the delivery, all DIP switches are positioned on “OFF” (default).

Switch	Position	Function
1	off on	4800 Baud, corresponds to the default value on the TWM (EP111) 9600 Baud
2	off on	Normal operation mode for receipt printer TM-U295 version 2084.02.002.01, this means data in block mode are decodified and transferred to the printer in the transparent mode. For the operation mode of the printer TM-295 up to the version 2084.02.002.00. The data transferred from the TWM may not be modified. This corresponds to the attitude of the printer control gear version 2084.72.031.03.
3	-	-
4	-	-



Illustr. 1-13: Connection diagram for Printer Control Gear 2084.72.031.10

Pin	Colour	Description
1	black	Plus (+) of 24 V of the board circuit
2	blue	Plus (+) 24 V to EVM
3	white	Minus (-) GND of the 24 V board circuit
4	white	Minus (-) GND 24 V to EVM
5-9		Data line EVM - printer

Pin allocation TDL-RS 232C/ 422/ 485 (X4)

Connection of different physical connection possibilities of an external PC over a 15-pole strip „Combicon“.

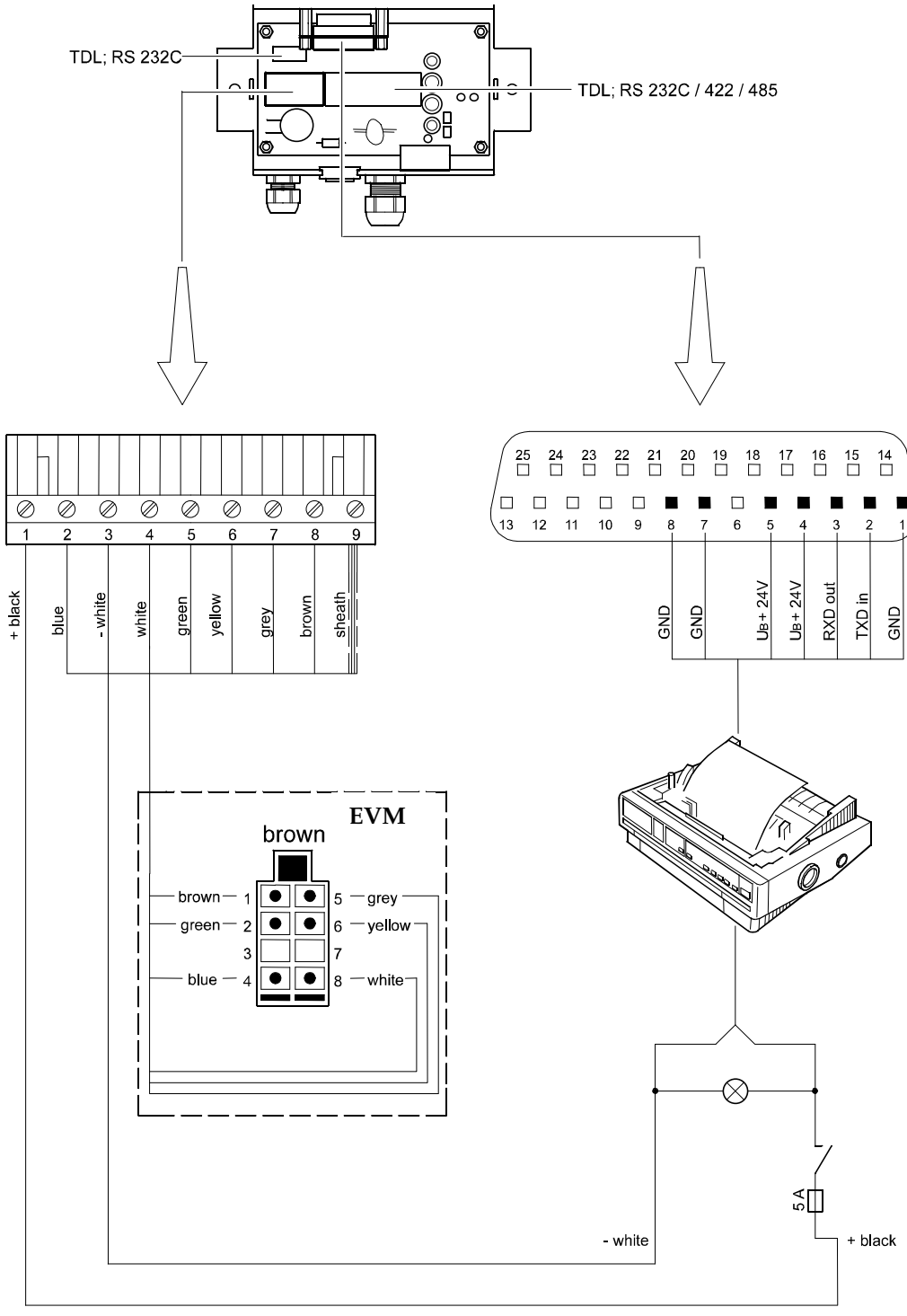
Pin (x4)	Signal	Interface	I/O	
10	RXD	RS232C	out	
11	DSR	RS232C	out	
12	TXD	RS232C	in	
13	RTS	RS232C	in	
14			GND	
15	EN.L	RS485	in	RS422 open
16	TXA	RS422	out	
17	TXB	RS422	out	
18	RXA	RS422	in/ out	RS485 A
19	RXB	RS422	in/ out	RS485 B
20			GND	
21	RXD	TTL	out	
22	DSR	TTL	out	
23	TXD	TTL	in	
24	RTS	TTL	in	

ATTENTION!

Only one interface RS232C, RS422 or RS485 may be used.

1.15 Printer Connection Box LQ-570+ 2084.80.04.xx

1.15.1 Connection with TDL interface



Illustr. 1-14: Connection Diagram for Printer connection box LQ-570+ with TDL-Interface

Pin allocation printer connection

Pin	Assignment
1	GND
2	TXD in
3	RXD out
4	U_B +24 V
5	U_B +24 V
6	Not connected(nc)
7	GND
8	GND
9-25	Not connected (nc)

Pin allocation EVM connection

Pin	Assignment
1	GND
2	TXD in
3	RXD out
4	U_B +24 V
5	U_B +24 V
6	Not connected(nc)
7	GND
8	GND
9-25	Not connected (nc)

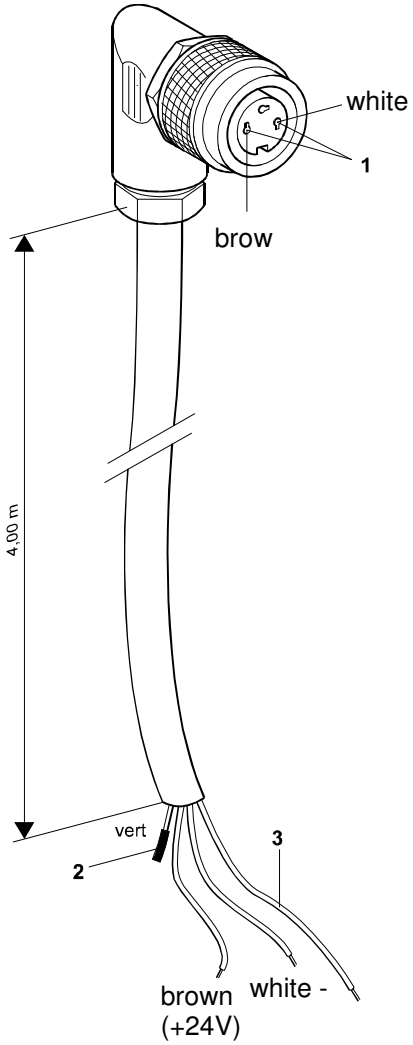
Pin allocation EVM connection

Pin	Colour	Description
1	black	Plus(+) from the 24 V on-board PSU
2	blue	Plus (+) 24 V to EVM
3	white	Minus (-) GND
4	white	Minus (-) GND
5	green	S_RXD out
6	yellow	S_GND
7	grey	S_RTS in
8	brown	S_TXD in
9		Screen GND

Part numbers components to LQ-570+

Order nubmers	Component
2084.80 04 00 00	Printer connection box
2084.80 03 00 00	Paper supply rack (also ground plate)
2084.80 02 00 00	Printer EPSON LQ-570+
HC53.6500.003	Angle junction box, 3-pole, at printer power line
HC05.5618.005	Printer power supply cable 3 x 0,75 mm^2, L = 4 m
2084.78.016.00	Data line printer – printer connection box with 25-pole connector
2084.90 20 0x 00	Data line EVM – printer connection box

1.15.2 Cable configuration of 24 V Power Supply



Illustr. 1-15: Cable configuration for power supply with angle junction box for printer LQ-570+

ATTENTION!

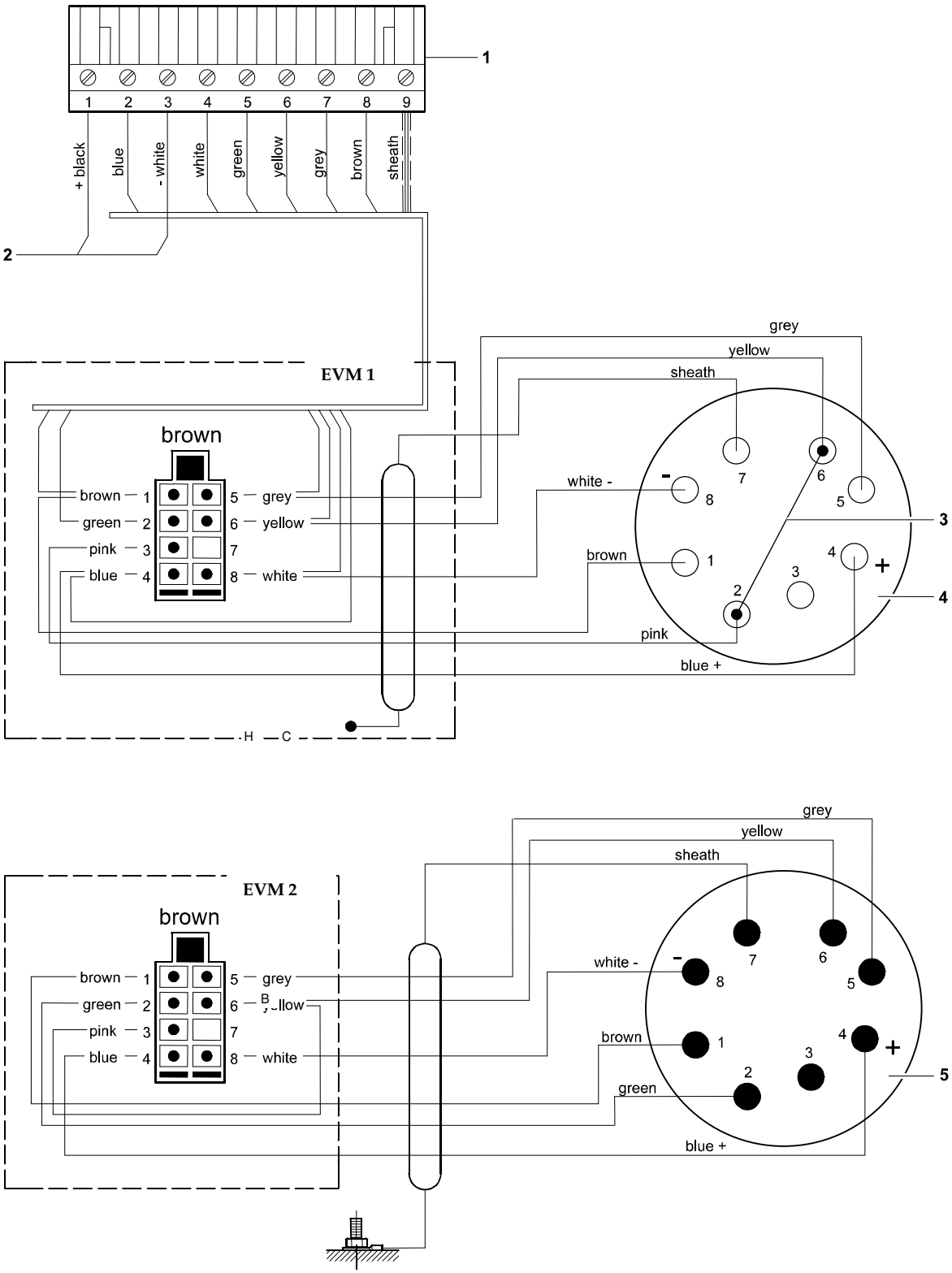
The cable components for the 24 V power supply must be assembled out of the separately delivered components.

Before assembling, please note:

- In the angle junction end (1) the brown and the white leads must be soldered
- On-board PSU:
  - the green lead (2) must be cleanly cut and insulated,
  - the sheathing of the shielding must be insulated and
  - the shielding (3) must be connected to minus.

The connection to the electrical system must take place behind the off-witch and its own fuse I - 8 A.

1.16 Connection of two EVM's to one printer



Illustr. 1-16: Connection Diagram for connection of two EVM to one printer

Pos.	Description
1	Printer connection box
2	Connection to 24 V on-board PSU
3	Bridge between wiring points 2 and 6
4	Socket connector
5	Trailer connector

ATTENTION!

Printer

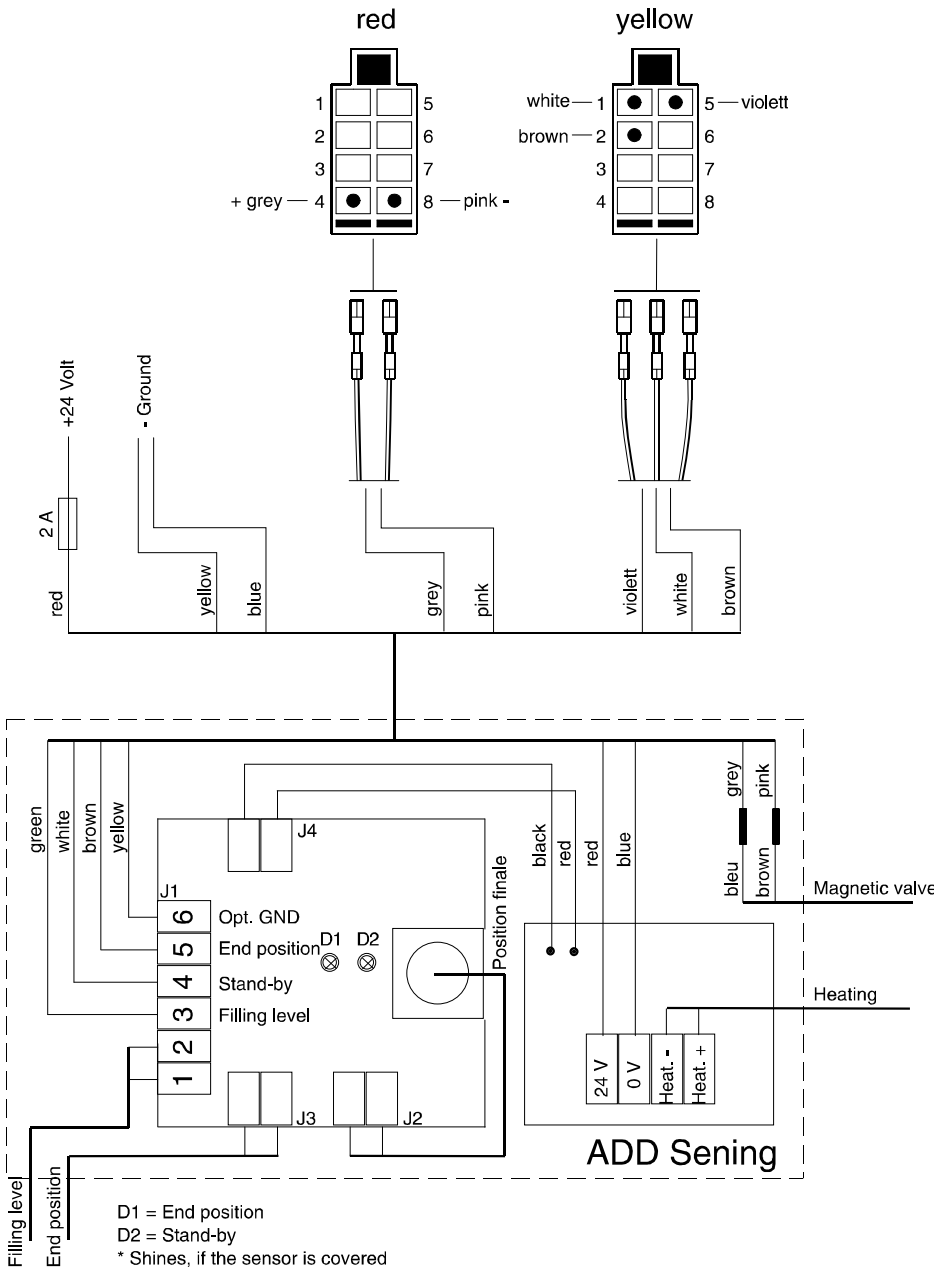
- LQ-570+ must be connected directly with the electrical system (safety 2 A)
- TM295 can be supplied through the printer connection box 2084.72.030.06 / 2084.72.131.11 and 2084.72.031 03.

If in the tractor an EVM is attached (EVM 1) and in the trailer a second EVM (EVM 2) is installed, a bridge (3) between the connection points 2 and 6 on the socket plug (4) must be inserted when uncoupling the trailer.

Without bridge no printer function!

1.17 Additive pump at EVM in AIII Filling System

1.17.1 Sening additive pump “ADD”



Illustr. 1-17: Connection Diagram for additive pump (company Sening) at EVM in AIII Filling system

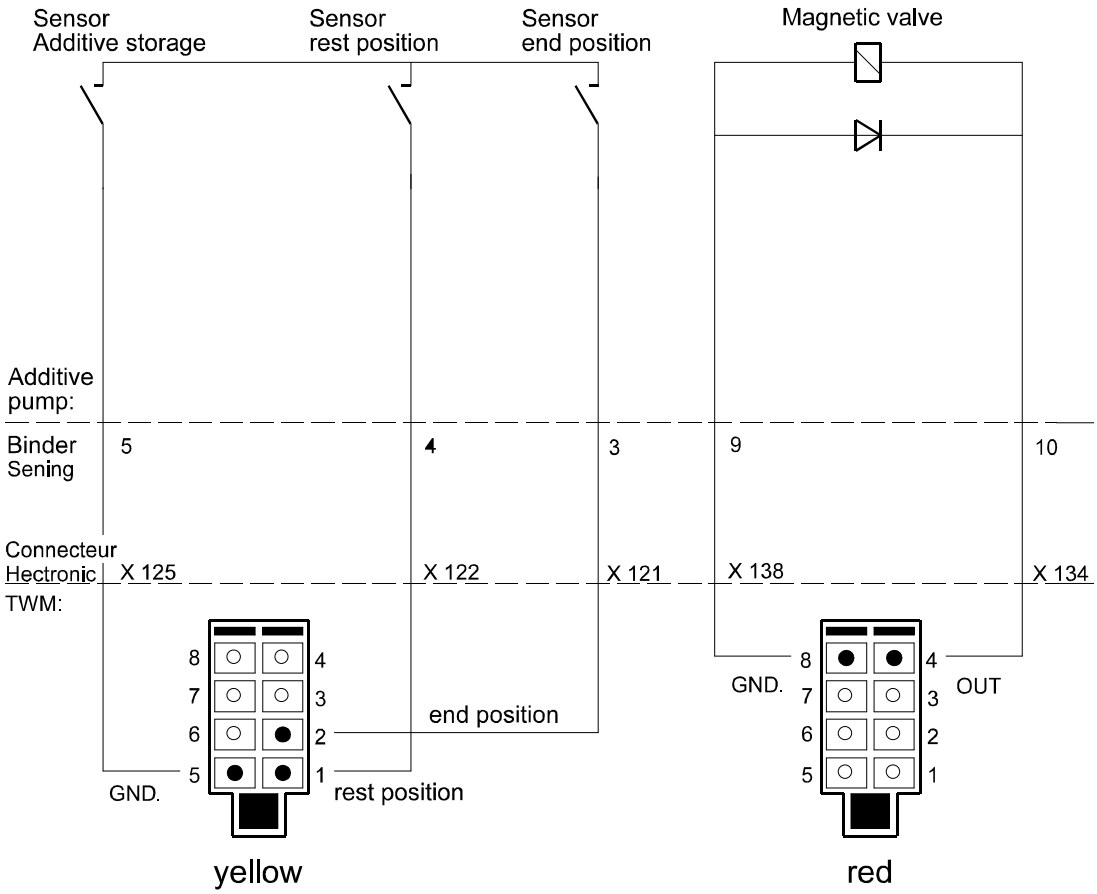
Pos.	Description
1	Terminal strip of the Sening additive pump
2	Voltage supply / Connection to 24 V-on-board PSU

ATTENTION!

Bonding: The ground wire (screen) of the control line has to be provided on two faces with ring lugs and attached to the housing.

All specifications as well as safety notes to the assembly, line-up, measuring, maintenance, error detection etc. have to be taken from
the operating instructions, part number DOK-321 of Sening GmbH.

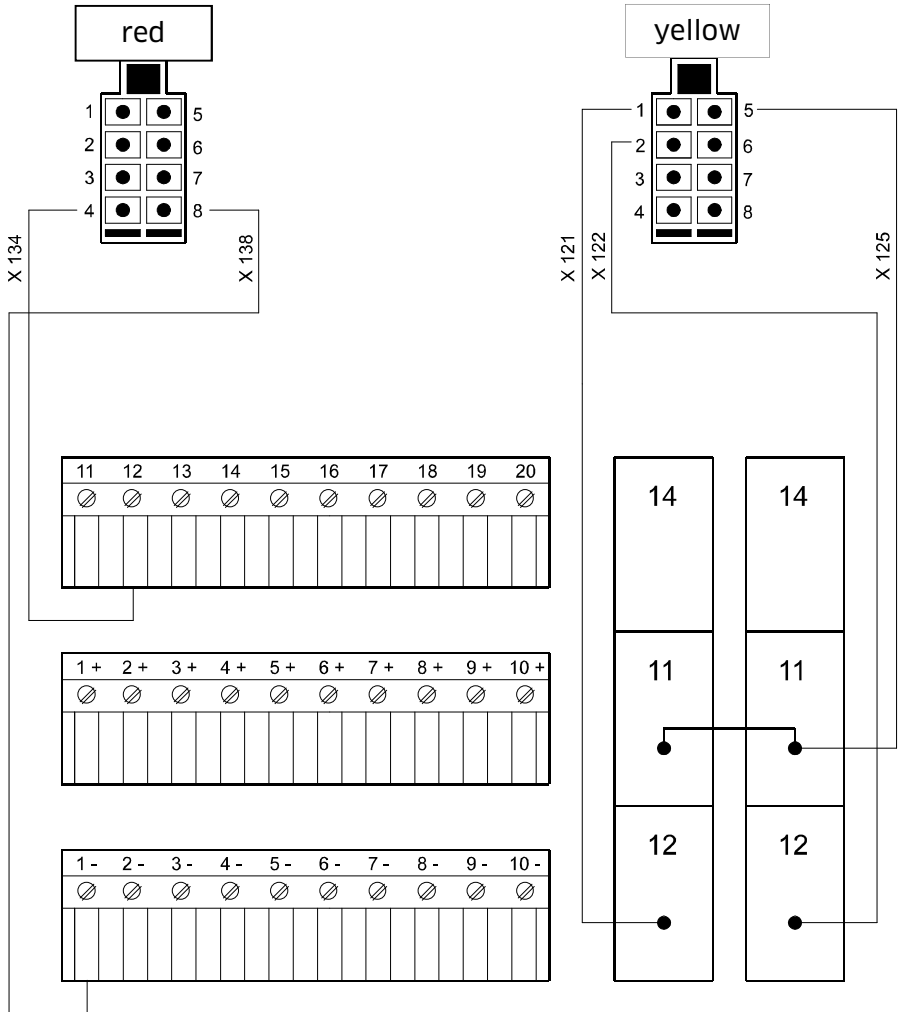
Sensor and Control signals „Sening Additive pump



Illustr. 1-18: Control signals for additive pump (company Sening) at EVM in AIII Filling system

Sening Additive pump	Input final position	Input quiescent position	Remarks
Piston quiescent position	5 V	0 V	
Piston intermediate position	5 V	5 V	
Piston end position	0 V	5 V	
Additive storage vessel empty	5 V	5 V	ERR 50/ ERR53

1.17.2 Additive Pump ADD 110



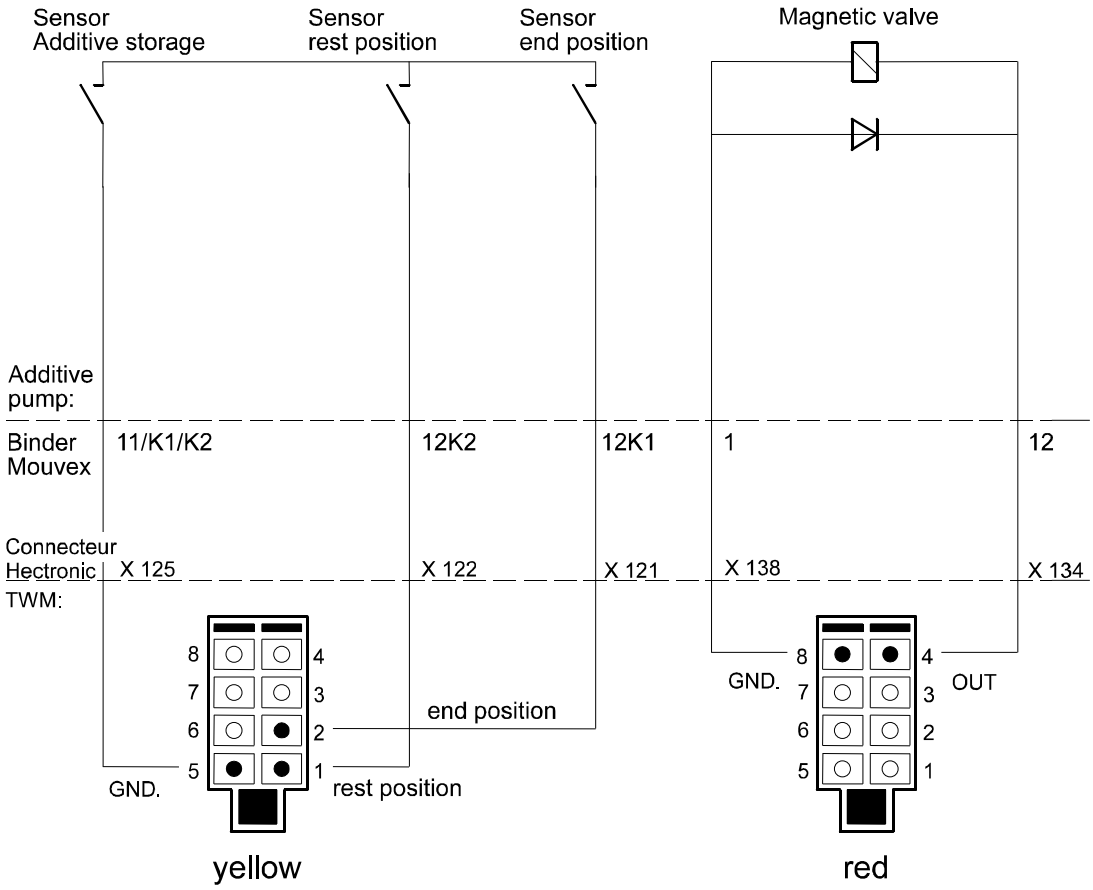
Illustr. 1-19: Connection diagram for additive pump (company Blackmer) at EVM in AIII Filling system

ATTENTION!

Bonding: The ground wire (screen) of the control line has to be provided with ring lugs on two faces and attached to the housing.

All specifications as well as safety notes to the assembly, line-up, measuring, maintenance, error detection etc. are to be taken from the
technical information of the Blackmer.

Sensor and control signals „Blackmer Additive pump“

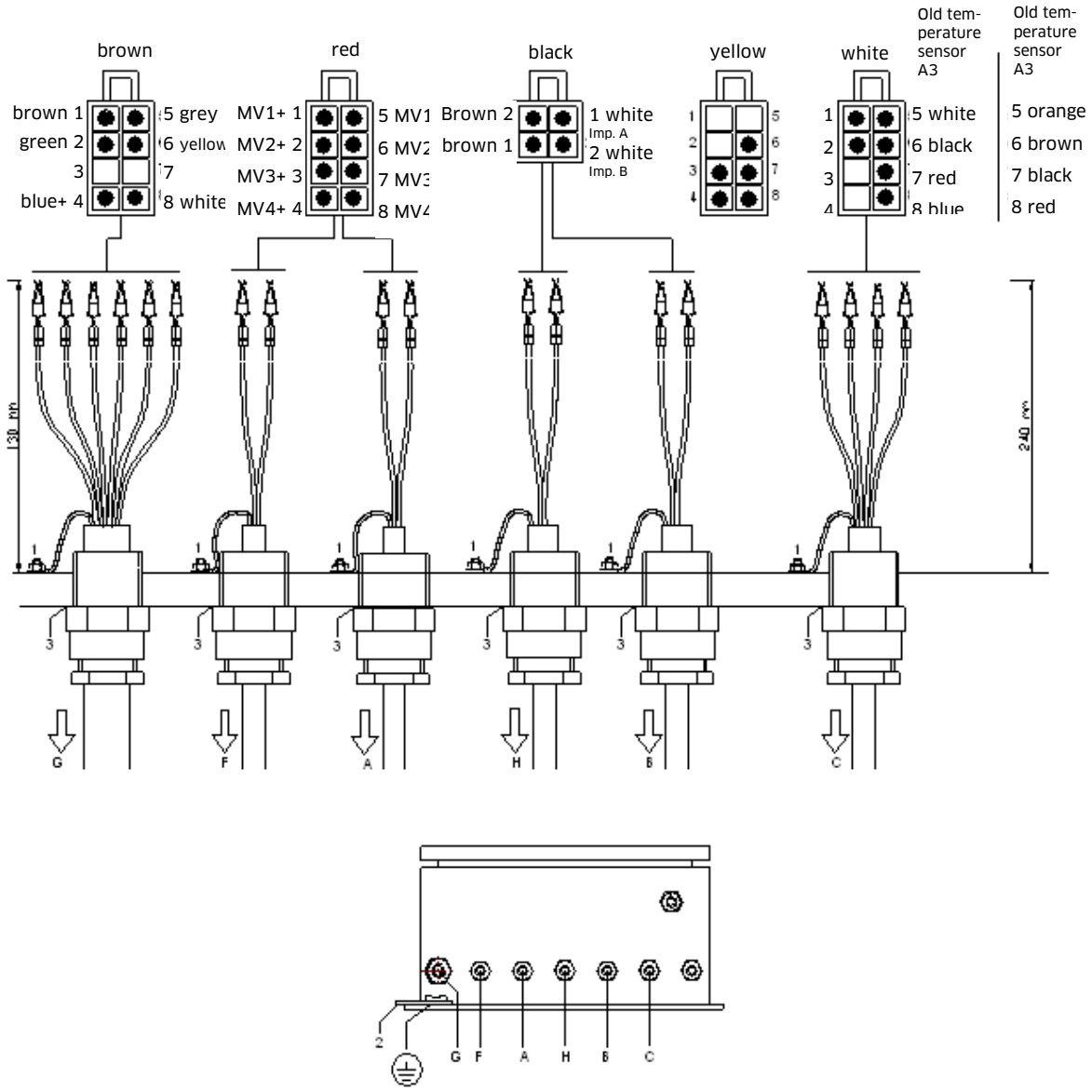


Illustr. 1-20: Control signals for additive pump (company Blackmer) at EVM in AIII Filling system

Blackmer additive pump	Input final position	Input quiescent position	Remarks
Rest position	5 V	0 V	
Intermediate position	5 V	5 V	
End position	0 V	5 V	
Additive storage vessel empty	0 V	0 V	ERR 51

1.18 C7/14 IG- Link Sening Measuring Chamber GMVZ 1004/ GMVT 704/ GMVT 805

1.18.1 Measuring Point A in AIII-Filling System



Illustr. 1-21: Connection Diagram for IG link measuring point A in AIII filling system

Pos.	Description
A	Additive pump MV / MV4
B	Pulse generator 1/ 1
C	Temperature sensor 1
D	Additive pump controller MV 3, EMV or M16 (yellow or white)
F	Solenoid valve MV 1 (general release AF)
G	Printer/ electrical system
H	Pulse generator 1/ 2
1	Connection to earth of EVM casing
2	Connection to earth of vehicle chassis
3	Threaded joints CMP-/ Ex

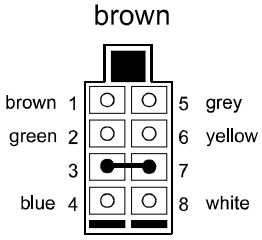
ATTENTION!

All connections to earth (1) must be made using a yellow-green cable with diameter 6 mm^2. The maximum cable length is 50 mm.

The connection to earth (pink) to the chassis (2) must be ended using a ring terminal.

Cable entry (D):
Use the screw connections of the enclosed package according to the type of cable. For shielded cable use the EVM type otherwise the standard PC type.

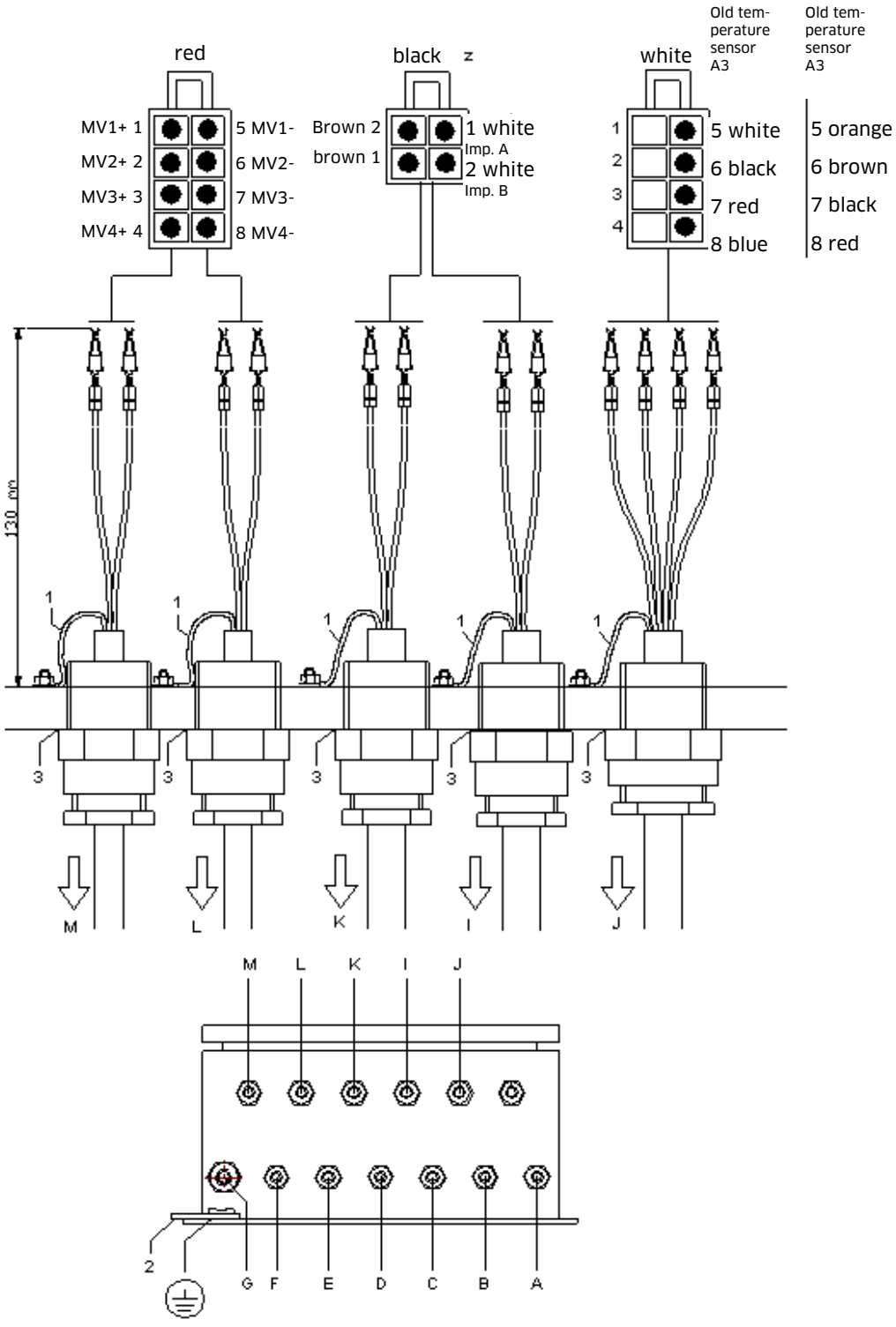
With the EVM 2084.32.100.00 starting from serial no. 734 and EVM
2084.32.200.00 starting from serial no. 295 (double calculators) pins 3 and 7 must be bridged.



Applies **only** to standard installations (one EMV and one printer)!

With the installation of EMV's which are separated from each other but have access to one printer pins 3 and 7 must **not** be bridged.

1.18.2 Measuring Point B in AIII-Filling System



Illustr. 1-22: Connection diagram for IG link measuring point B in AIII filling system

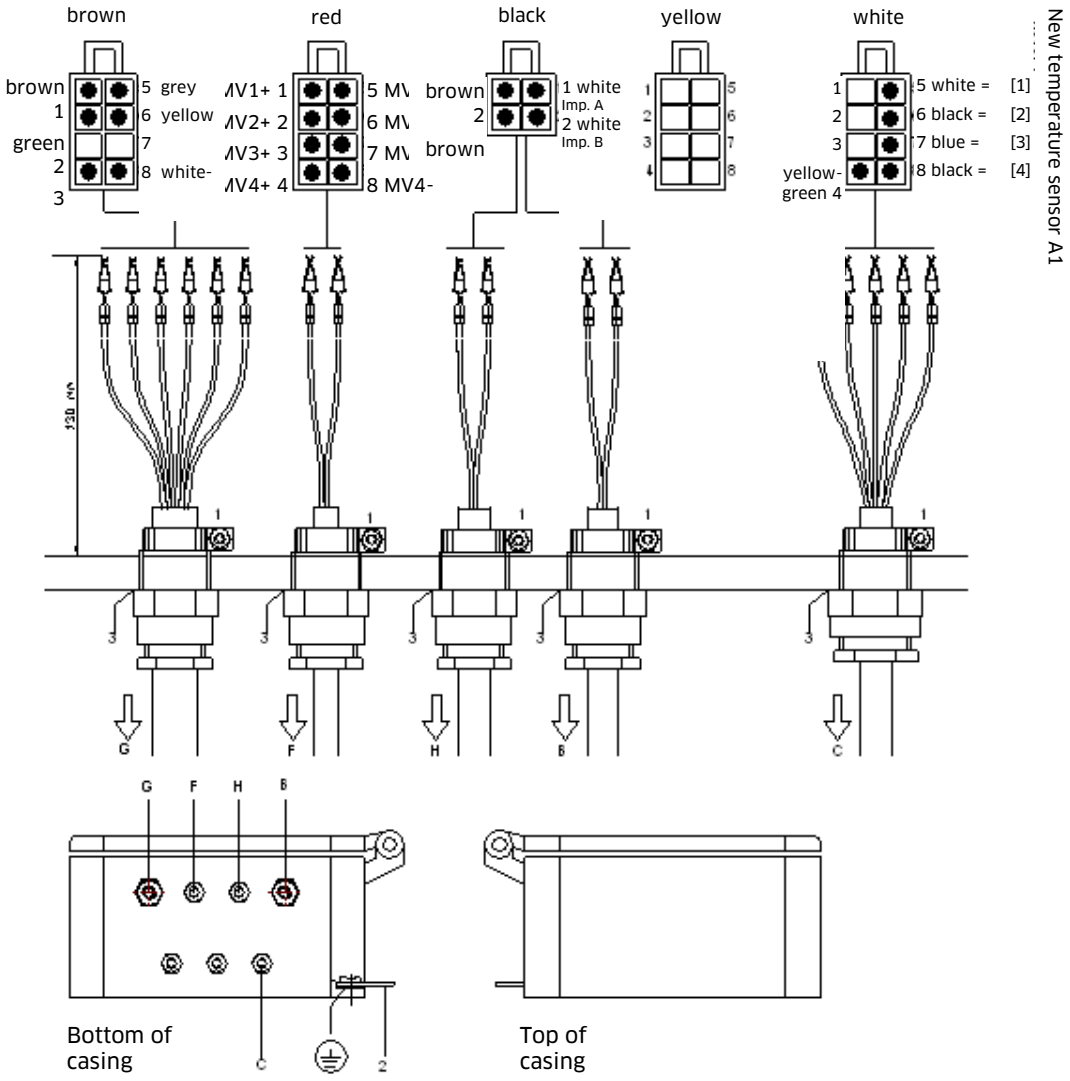
Pos.	Description
I	Pulse generator IG 2/2
J	Temperature sensor 2
K	Pulse generator IG 2/1
L	Solenoid valve MV 1 (general release AF2)
M	Solenoid valve MV 2 (pulse release IF2)
1	Connection to earth of EVM casing
2	Connection to earth of vehicle chassis
3	Threaded joints CMP-/ Ex

ATTENTION!

All connections to earth (1) must be made using a yellow-green cable with diameter 6 mm^2. The maximum cable length is 50 mm.

The connection to earth (pink) to the chassis (2) must be ended using a ring terminal.

1.18.3 Measuring Point A in AI-Filling System



Illustr. 1-23: Connection Diagram for IG link measuring point A in AI

Pos.	Description
B	Pulse generator 1/2
C	Temperature sensor 1
F	Solenoid valve MV 1 (general release AF1)
G	Printer/ electrical system
H	Pulse generator 1/1
1	Connection to earth of EVM casing
2	Connection to earth of vehicle chassis
3	- Threaded joints CMP-/ Ex

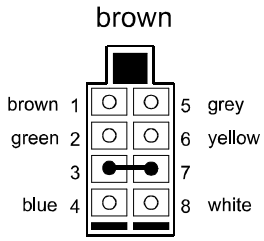
ATTENTION!

All connections to earth (1) must be made using a yellow-green cable with diameter 6 mm^2. The maximum cable length is 50 mm.

The connection to earth (pink) to the chassis (2) must be ended using a ring terminal.

Option additive pump:
If the additive pump input line (additive pump - controller) is protected, please cable input with AF1 to under-wedge the screen at cable clip exchange.

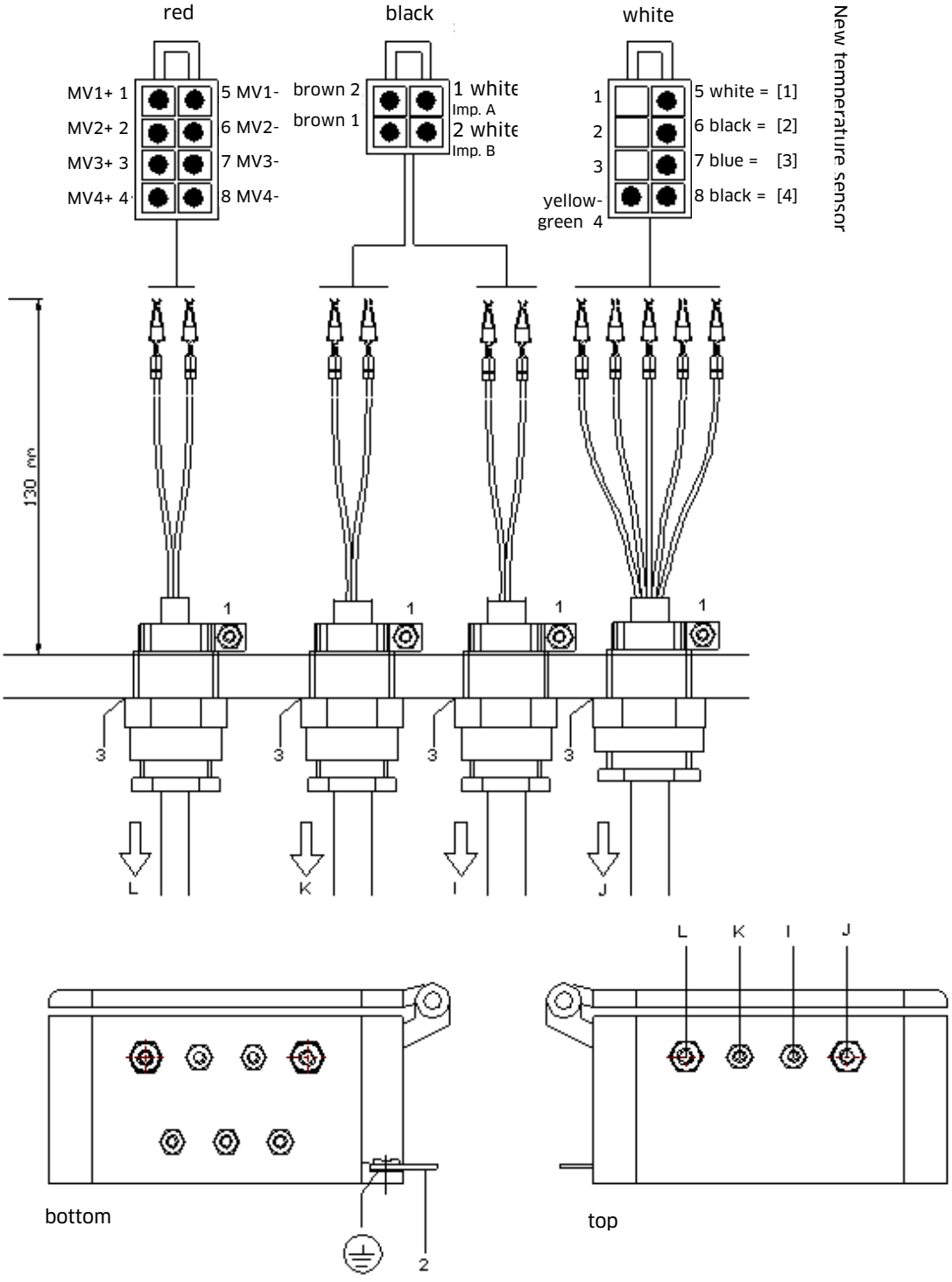
With the EVM 2084.32.100.00 starting from serial no. 734 and EVM 2084.32.200.00 starting from serial no. 295 (double computers) pins 3 and 7 must be bridged.



Applies **only** to standard installations (one EMV and one printer)!

With the installation of EMV's which are separated from each other but have access to one printer pins 3 and 7 must **not** be bridged (*no bridge*).

1.18.4 Measuring Point B in AI-Filling System



Pos.	Description
I	Pulse generator IG 2/2
J	Temperature sensor 2
K	Pulse generator IG 2/1
L	Solenoid valve MV 1 (general release AF2)
1	Connection to earth of EVM casing
2	Connection to earth of vehicle chassis
3	Threaded joints CMP-/ Ex

ATTENTION: EX REGULATIONS!

All connections to earth (1) must be made using a yellow-green flexible cable with diameter 6 mm^2. The maximum cable length is 50 mm.

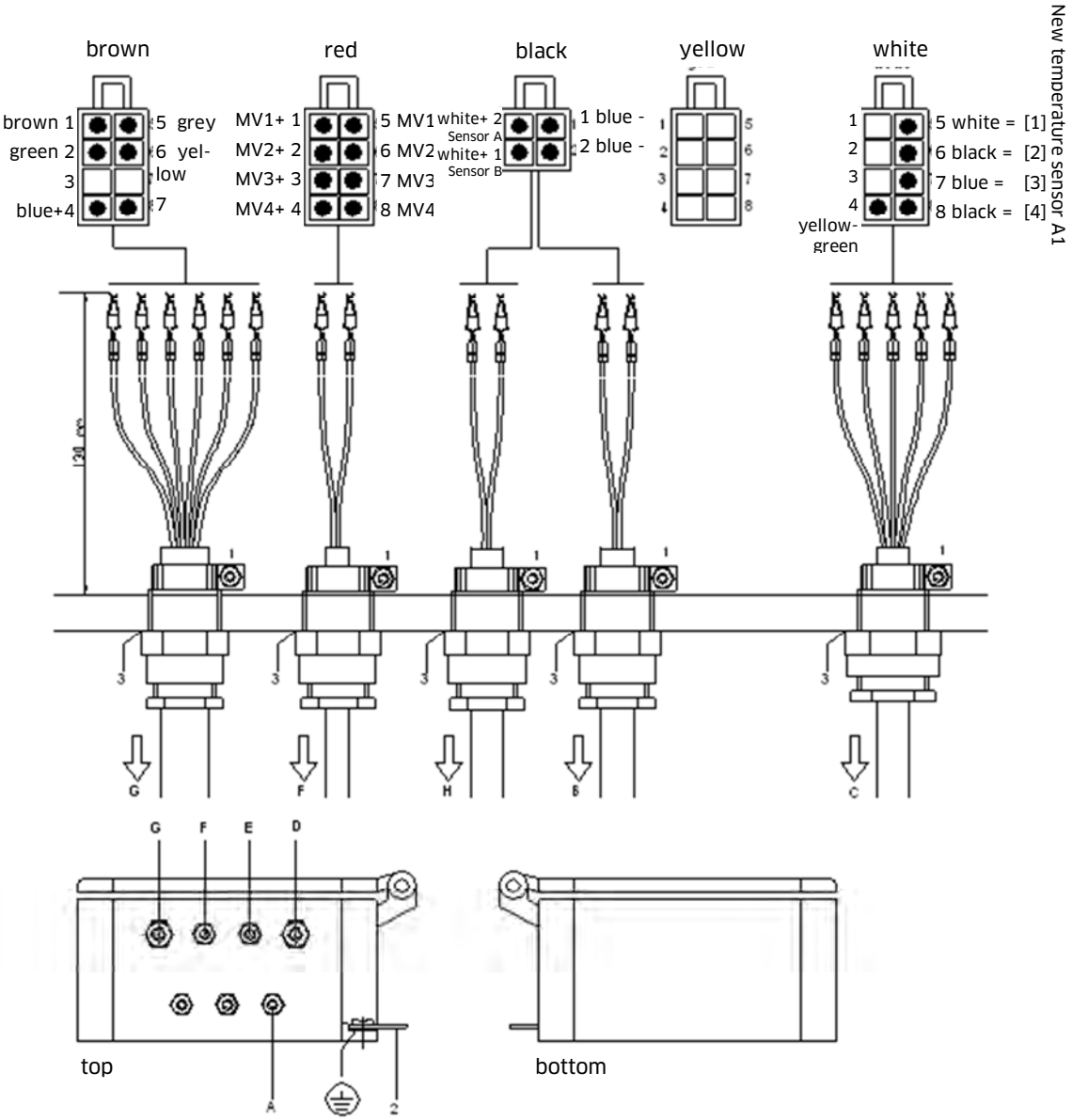
The connection to earth to the chassis (2) must be ended using a ring terminal.

All CMP (3) threaded joints, threaded joints subsequently executed and blind plugs must be secured using Loctite 275 or 270.

Shielding of the temperature sensor connection cable (4) must be stripped (connection to earth within printer).

The ground connection (2) does not have to be executed for measuring system B, if measuring system A is connected with the vehicle mass already.

1,19 Namur DIN 19234 Connection to Turbine Wheel Counters PT-Meter Z 1403-1P



Illustr. 1-25: Connection Diagram Namur DIN 19234 to turbine wheel counters PT-Meter Z 1403-1P with 2-channel pulse output

Pos.	Description
B	Pulse generator A
C	Temperature sensor 1
F	Solenoid valve MV 1 (general release AF1)
G	Printer/ electrical system
H	Pulse generator B
1	Connection to earth of EVM casing
2	Connection to earth of vehicle chassis
3	- Threaded joints CMP-/ Ex

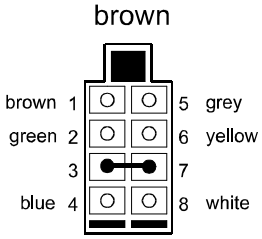
ATTENTION!

All connections to earth (1) must be made using a yellow-green flexible cable with diameter 6 mm^2. The maximum cable length is 50 mm.

The connection to earth (pink) to the chassis (2) must be ended using a ring terminal.

Option additive pump:
If the additive pump input line (additive pump - controller) is shielded, please exchange cable input with AF1 to under-wedge the screen at cable clip.

With the EVM 2084.32.100.00 starting from serial no. 734 and EVM 2084.32.200.00 starting from serial no. 295 (double computers) pins 3 and 7 must be bridged.



Applies **only** to standard installations (one EMV and one printer)!

With the installation of EMV's which are separated from each other but have access to one printer pins 3 and 7 must **not** be bridged (*no bridge*).

1:20 Trailer-Connection-Cable

Plug allocation

No.	Colour
1	blue +
2	coding pin
3	white –
4	shielding
5	green
6	yellow
7	grey
8	brown
9	coding pin
10	(NC) not connected
11	(NC) not connected
12	(NC) not connected
13	(NC) not connected

ATTENTION!

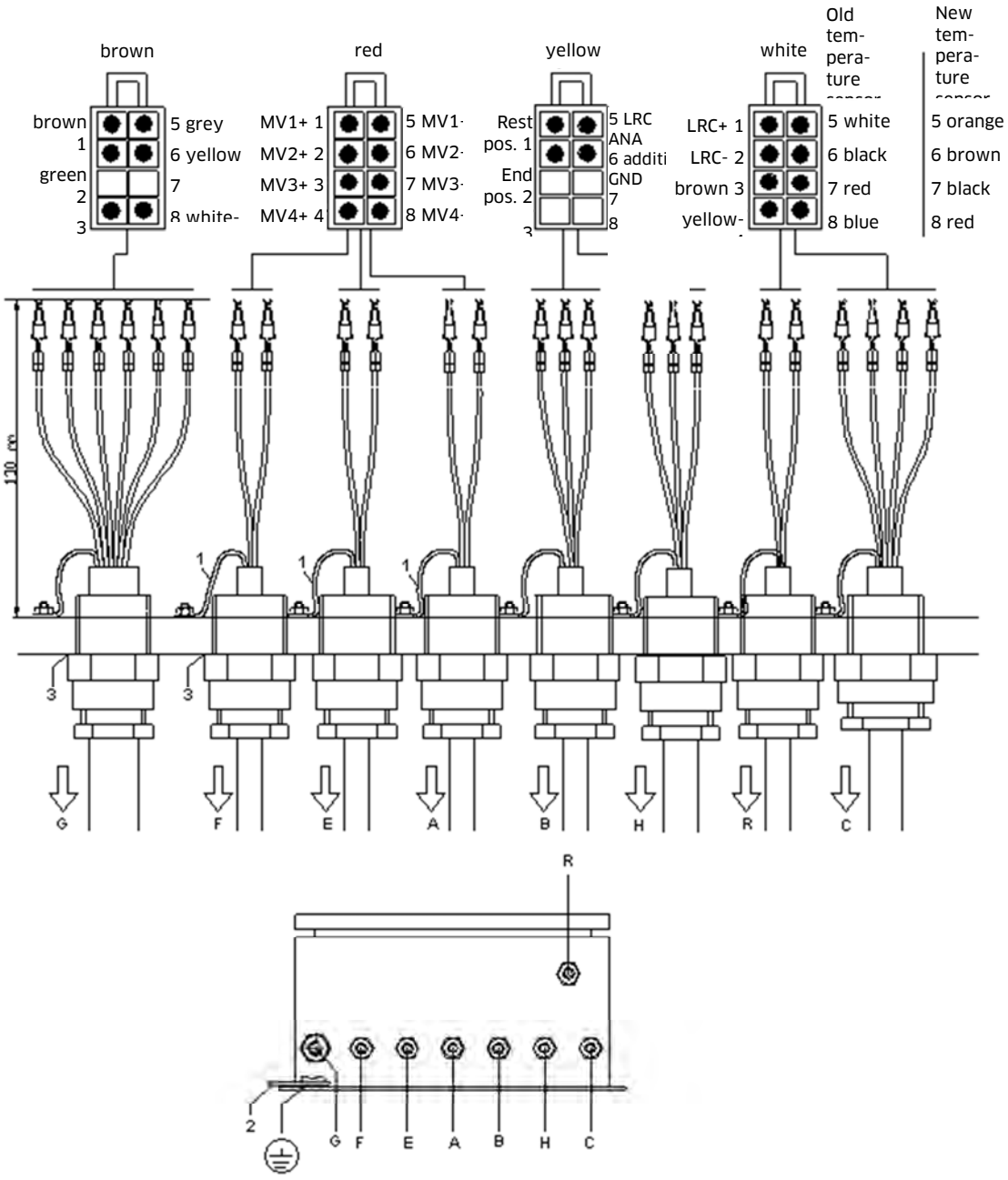
Shielding to be mounted according to connection diagrams!

In order to prevent connection errors of the 13 pin AMP connector the following precautions must be taken:

Plug, Pin 2 and 9 -> solder the opening

Socket, Pin 2 and 9 -> remove coding pin

1:21 Trailer-Connection-Cable



Illustr. 1-26: Connection Diagram for LRC and GND additive pump

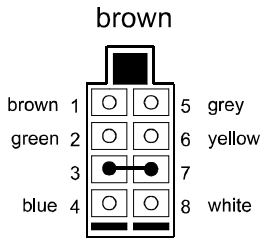
Pos.	Description
A	Additive pump
B	Throttle valve From hardware version 2084.72.054.03 PIN 6 = GND (earth) PIN 1 = rest position PIN 2 = end position
C	Temperature sensor
E	Solenoid valve MV2 (puse release IF1)
F	Solenoid valve MV 1 (general release AF1)
G	Printer / electrical system
H	LRC ANA
R	LRC / overfill prevention system **From hardware version 2084.72.054.03** White plug PIN 1 = 24V output solenoid valve PIN 2 = GND output solenoid valve PIN 3 = vanne de déblocage Yellow plug PIN 5 = ANA activation
1	Connection to earth of EVM casing
2	Connection to earth of vehicle chassis
3	Threaded joints CMP-/ Ex

ATTENTION!

All connections to earth (1) must be made using a yellow-green flexible cable with diameter Ø 6 mm^2. The maximum cable length is 50mm.

The connection to earth (rose) on chassis (2) has to be ended using a ring terminal.

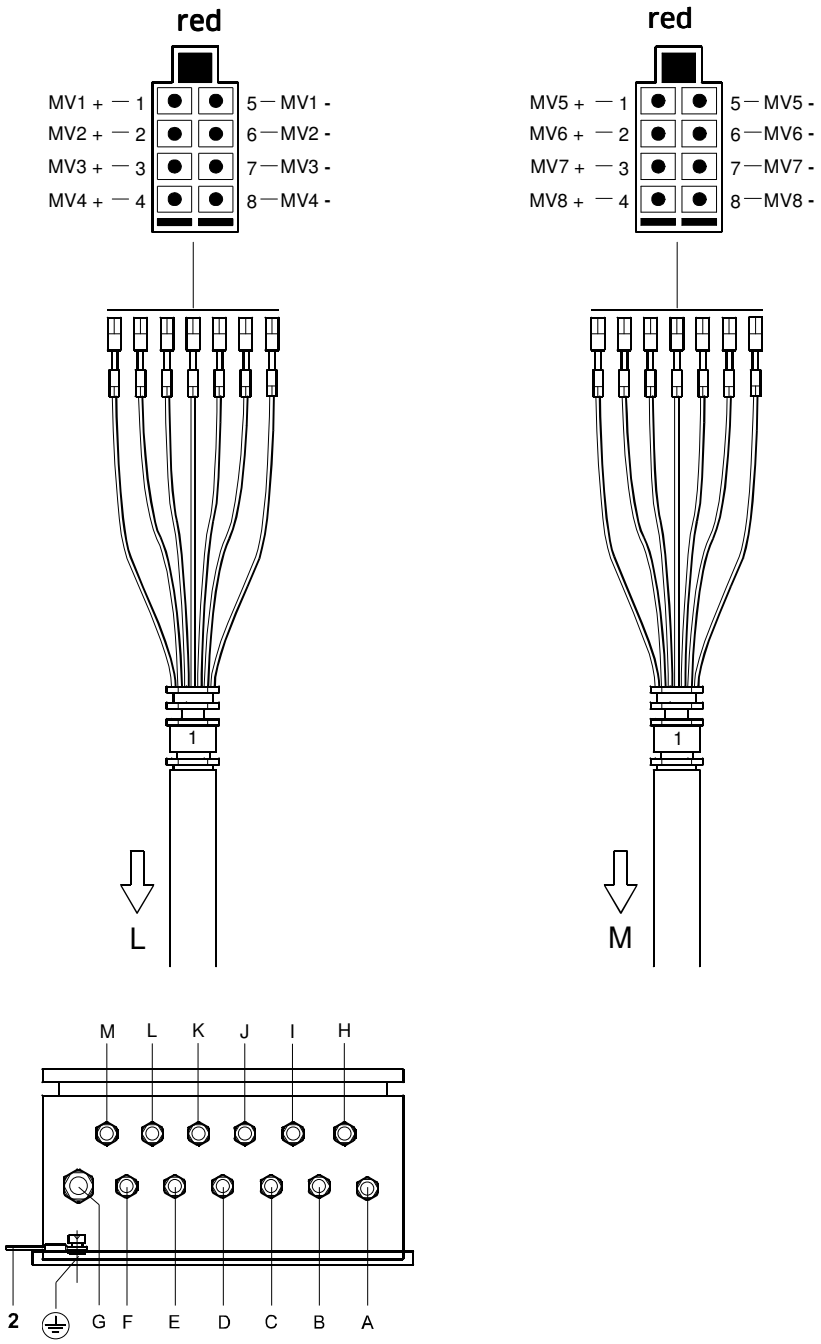
For the EMZ 2084.32.100.00 from series n° 734 and EMZ 2084.32.200.00 from series n° 295 (double calculator) the PINs 3 and 7 have to be bridged.



Applies **only** to standard installations (one EMV and one printer)!

With the installation of EMV's which are separated from each other but have access to one printer pins 3 and 7 must **not** be bridged.

1.22 Integrated Delivery Control (IAS) in AIII-Filling System



Illustr. 1-27: Connection Diagram for magnetic valves 1-8 to the EVM

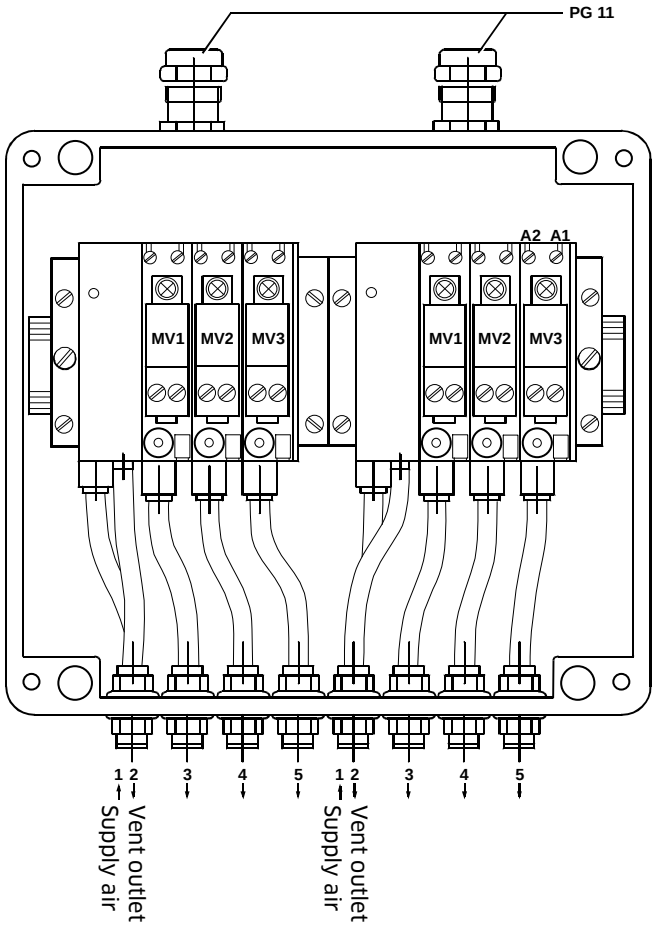
Pos.	Description
A–H	See fig. 1-1: Connection diagram for IG-connections measuring system in AIII-Filling system
I - K	Screw connections : 3 x M16
I	Pulse generator IG channel A (clamp 3 / 4)
J	Temperature sensor, EMC-tight M16 cable screw connection
K	Pulse generator IG channel B (clamp 1 / 2) EMC-tight M16 cable screw connection
L	Solenoid valve MV 1 – 4 M20
M	Solenoid valve MV 5 – 8 M20
1	Connection to earth of EVM casing
2	Connection to earth of vehicle chassis
	The standard screw connection (L) and (M) is provided with M16. If necessary (number of valves) the threaded holes (L) and (M) of the housing must be widened up to 20 mm in diameter and the screw connection HC11.2132.M2015.710 with locknut HC11.2131.M2015.05 must be installed. **Order numbers :** Screw connection HC11.2132.M2015.710 Locknut HC11.2131.M2015.05
	Connecting cable between valve box and TWM **Order number :** Cable 7 x 0.75 mm^2 2084.90 20 00 00

ATTENTION!

All connections to earth (1) must be made using a yellow-green flexible cable with diameter Ø 6 mm^2. The maximum cable length is 50mm.

All non-connected cables (others) have to be equipped with a ring terminal and be positioned on the connection to earth to the chassis (2).

1.22.1 Magnetic Valve Box MV6 / E2 for AIII-Filling System



Illustr. 1-28: Connection Diagram for magnetic valves in the magnetic valve box MV6

Connexion: A2 = Plus +24 V
A1 = Minus –24 V

Screen of the connecting cable must be put on the valve mounting rail.

2. Brief Operating Description of TWM 2084

2.1. Switching on the System

1. Switch on the vehicle main switch.

   When starting, the system executes a self check. It is checked whether the hardware and the program memory of the electronic volume meter (EVM) function perfectly.

   If an error is found and the system is thereby not operational, an appropriate error message will be displayed.

   The following main menu is displayed:

   1: Filling
   2: Start trip
   3: Reports
   4: Service

PC-delivery yes / no

2. Press the # key.

   The display shows:

   5: Service 2

3. Input " 5 " in order to call the submenu " service 2 ".

   The display shows:

   1: PC-delivery
   2: Diagnose

4. Input " 1 " in order to call the PC - Delivery function

   The display shows:

   PC-delivery: 0

5. To activate / deactivate the PC-delivery mode enter “1” or “0”.

   Press the **Enter key** to end the configuration.

ATTENTION!

Depending on the parameter settings, before the first filling

- start trip (parameter 161) and / or
- enter master-/ driver code (parameter 200).

Prepare filling

Call up filling

1. Enter “1” on the TWM to call up filling.
   The following display appears:

   Customer no:
   Price/100l: VAT incl.
   Product:
   Preset: l

Enter customer no

2. Enter the customer no. and press the **Enter key** or skip this function by pressing the Confirm key without entering any data.

Enter basic price

3. Enter the basic price per 100 l (with leading zero) and press the **Enter key** or to skip this function press the **Enter key** without entering any data.

Enter or select product

4. Enter the product number (for example „1“for Fuel Oil EL , „2“ for Diesel an so on) or select the next product with the **#-key**.

5. Confirm the product selection with the **Enter key.**

Activate pre-set value

6. Press the **# key** if you want to activate the preset amount (in currency).
   You can return to the preset volume by pressing the # key.

7. Enter the preset value and press the **Enter key** or to skip this function press the **Enter key** without entering any data.

Confirm or correct input

8. When all entries are correct, press the **Enter key** or return to line 1 with the **Clear key** to correct your entries.

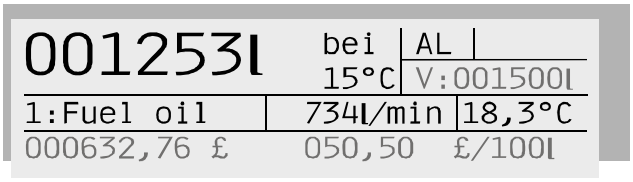
   With the confirmation of the data the display test is started. All pixels become dark for 1 s and then bright for another second (for single and double calculators). If the display test is successful, the delivery mask appears on the display and the system is ready for delivery.

Fill and stop fill

Filling

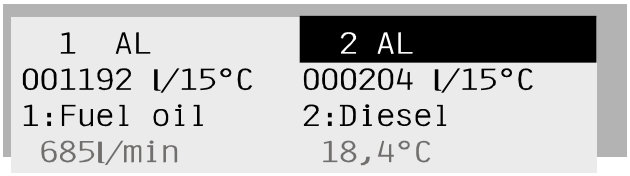
9. Open chamber valve and start filling.

Single measuring system



Double measuring system

The first line (measuring point number, status) of the measuring point
which is active is inversely represented, in the example below the
measuring point " 002 " side B.



10. Set the flow rate and temperature display with the **#-key**:

    Press 1 x flow rate display
    Press 2 x temperature display
    Press 3 x flow rate and temperature
    Press 4 x Switch off function

Strobe of the uncompensated quantity

11. The uncompensated quantity can be displayed during delivery with the **0-Key**:
    Press 1 x uncompensated quantity display
    Press 2 x switch off the uncompensated quantity display (no more 10 s-timeout)

Stop filling

12. There are three ways to stop filling
    - manually with the **Exit key**
    - if the overflow sensor is activated with the **Exit key**
    - automatically when the preset value is reached

    Line 1 of the display shows “EF” when filling is complete.

Optional functions at the end of filling

Open Clear menu

13. Press the **Clear key.**

    The following display appears

    1: Continue filling
    2: New basic price
    3: Prices
    4: Addit. Products
    5: Temperature Volume Compensation
    (is displayed by pressing # key)

- Select “1: Continue filling“ and open the valve again.
- Press “2” to enter a new basic price (five digits including two decimal places)
- Use function “3: Prices” only if you have entered basic prices without VAT.
- Press “4” and then use the **#-key** to select the additional product you want to print on the delivery receipt.
- Use function “5: Temperature-Volume Compensation” to adjust the display of the compensated and uncompensated volume to be dispensed.

Close Clear menu

14. Exit the function with the **Exit key.**

15. Press the **Exit key** again to return to the display at the end of filling.

CAUTION!

If two EVM’s are connected to one printer, start the second print only after the first is complete.

2.3. Printing a Trip Report (Summary Receipt)

Select report analysis

16. After route end select the function “3: Analyses” in the main menu.
17. Enter “1”for the selection of " 1: Route log "

Select report type

18. To print “current log” enter “1”, to print “last log” enter “2”

Print report

19. Place DIN A4 paper in the printer and press the **Print key** to start printing.

Close function

20. After printing, press the **Exit key** until the main menu appears.

2.4. Switching off the System

Switching the TWM display on and off during a trip

- In the main menu, press the **Exit key** twice to turn off the display while driving.
- Press **any key** to bring the display back up when required.

Switching the TWM display off after a trip

- To turn off the display after a trip, press the **Exit-key** twice and then switch off the vehicle main switch.

3. Explanations to Customer and Receipt Parameters

3.1. Customer Parameters

CAUTION!

On change or view of parameters the help texts are displayed according to the language selection.

Content

The following parameters are further explained in this chapter:

158	Paper feed function of the printer
163	Flow rate
164	Product temperature
165	Receipt language
167	Maximum volume to be dispensed
171	Vehicle number
184	Language selection
204/ 206/ 208	VAT
243/ 244	Euro currency / exchange rate

Parameter 158: Printer paper feed function

The paper feed function is deactivated if you connect 2 TWM to a printer. As there is no automatic paper feed, you must press the Receipt key to feed a receipt into the printer.

- 0 inactive (2 TWM on one printer)
- 1 active (standard setting)

ATTENTION!

Do not start printing the second receipt until the first print is completed.

Parameter 163: Flow rate

Parameters for display of flow rates during filling:

- 0 not displayed
- 1 always displayed
- 2 displayed with **# key**

For more details, refer to parameter 164 on next page!.

Parameter 164: Product temperature

Settings correspond to parameter 163.

If parameter 163 or parameter 164 = 2 during filling, the corresponding temperature value is displayed when you press the **# key**. If you press the **# key** again, the temperature value will be hidden again.

If both parameters = 2, you have four options:

- 1 x **#-key** Flow rate
- 2 x **#-key** Temperature
- 3 x **#-key** Flow rate and temperature
- 4 x **#-key** Flow rate and temperature off

Parameter 167: Maximum Volume to be dispensed

The maximum volume to be dispensed per filling (e.g. 5000 l) can be defined through parameter 167. This value is independent of the preset volume. Filling is stopped when the lower of these two values is reached.

Parameter 204/ 206/ 208: VAT

You can assign three separate VAT rates to each product. For additional products, this option can be applied only to groups.

Further information is found in *chapter 5.2.3 "VAT".*

Parameter 243 and 244: Euro currency / rate

Two customer parameters are pre-defined for the Euro:

- 243 **Euro (Currency)** Parameter that determines the conversion / adjustment of home currency and Euro as key currency and/ or secondary currency.
- 244 **Euro (Exchange rate)** in form of an 8-digit text stringe for the definition of the exchange rate Euro - home currency. The input takes place in the usual way, e.g. during the input of the product names.

Detailed information is found in *chapter 7 "Euro".*

3.2. Language Selection

Parameter 184: Language selection (for Switzerland only)

With customer parameter (CP) 184 the (German / French / Italian) interaction language is defined.

Two versions can be assigned to the TWM 2084:

- 0 = Language selection "inactive"
  The interaction language is determined using parameter 155 (0 to 10) in the usual way.
- 1 = Language selection „active“
  Parameter 155 does not have a meaning in this adjustment. The interaction language can be set only to German, French or Italian.

When switching on the TWM 2084 after system start and system test the mask with the language selection menu appears:

1: DEUTSCH

2: FRANCAIS

3: ITALIANO

Selection of the interaction language

Enter the corresponding number to choose your language.

With the help of the Cancel or **Enter key** you choose the language that was adjusted upon the last system start.

In the display the main menu appears.

Product texts

The product texts for the German language are stored in the internal EPROM. The data may be stored into and read from an external EPROM module.

The product texts for the French and Italian language must be stored in the RAM memory. Therefore, storing of these data is not given on an external EPROM module.

CAUTION!

Upon loading the default values or data from an external EPROM module, the texts for each product are set equal for all languages.

Storing the data in the RAM memory enables any adjusting of the product texts by keyboard without EPROM exchange.

The Italian and French texts for each product are entered and stored using the basic menu choice “4: Service” and submenu choice “8: product destination” (just like the German texts).

3.3. Receipt Parameters and Receipt Layout

Parameter 165: Receipt language

The following languages are available:

- 0 German
- 1 Italian
- 2 French
- 3 English
- 4 Spanish
- 5 Hungarian
- 6 Czech
- 7 Croatian
- 8 Dutch
- 9 Slovenian
- 10 Polish
- 98 Select before printing (as previous value 4)
- 99 User language (as previous value 5)

The receipt language can be different from the interaction language, as defined in parameter 155. Settings from 0 - 7 define the language for printing. If the parameter is set to 98, you must select a language before printing. With the default setting 99, the receipt language is the language defined in parameter 155.

User defined layout

The information on the TWM 2084 receipt can be freely parameterised to a large extent. The user defines the lines to be printed. Certain lines which have to be printed due to calibration regulations are excepted.

Printing on availability of data

Several lines are only printed if the necessary data is available. Lines containing amounts, for example, are only printed when the price calculator function is active and the corresponding basic price has been entered.

Line sequence

The sequence of the lines is currently not freely selectable.

Access to different receipt types

Up to three different receipt parameter data records can be defined for fast access to different delivery note layouts and applications. The forms are then stored in the TWM. This receipt type can either be parameterised or selected before each printout by entering the necessary data directly.

Calibration Regulations

Lines containing measuring values, calculated according to the calibration regulations, or the amount to be invoiced are marked with an asterisk *. In additions to this, the amount lines and the line containing information on the compensated volume are printed in CAPITAL LETTERS.

Receipt paragraphs

The receipt is divided up into several logical paragraphs which can be separated by a dashed line and / or blank lines so that it can be read more easily. The number of blank lines can be freely defined.

Receipt layout

The first few lines are blank lines. The printer skips pre-printed information such as company logo, terms of delivery, product information, customer address, etc. The individual paragraphs include:

- Information lines (Paragraph 1)
- Receipt type (Paragraph 2)
- Customer data (Paragraph 3)
- Allocation data (Paragraph 4)
- Vehicle data (Paragraph 5)
- Measuring environment (Paragraph 6)
- Filling data (Paragraph 7)
- Invoice data (Paragraph 8)
- Additional products (Paragraph 9).

The individual paragraphs of the receipt

Information lines Copy, modified copy (error)

To reprint a receipt which has already been printed the system sends a COPY message.
If, in the meantime, the receipt layout has been altered or a different receipt parameter record selected, the system displays “modified copy”. Furthermore, the system prints a line containing the printing time.
If filling has been aborted due to a system error, the information line displays ERROR XX, with “XX” characterising the type of error. These lines are printed on request only.

Receipt type

There are two types of receipts available, “delivery note“ and “invoice“. The systems prints „invoice“ (parameter set to 2) when the price calculator function is active and a basic price stored. Otherwise, the system prints „delivery note“.

Allocation data

In addition to the lines for device number, number of the current measurement and the filling data requested by the calibration office, it is also possible to store the beginning ant the end of the filling.

Vehicle data

This line is used to identify the vehicle, the driver ant the chamber number when operating a tank truck with various chambers.

Measuring environment

The preset value (when entered) and the average temperature determined during the actual measuring procedure are printed.

Filling data

The filling data include the name of the product dispensed and the volume calculated from the basic temperature. Both lines are obligatory and prescribed by the calibration office.

It is also possible to print the volume measured without temperature compensation.

Invoice data

This includes the basic price, the net price without VAT, the actual VAT amount and the invoice amount.

Apart from certain parameters which have to be defined, these lines can only be printed when certain values are available; i.e. the basic price has to be entered for the individual fillings.

Additional products

One or more additional products may be printed such as additives. The lines are printed only if the products have been entered beforehand. If the product name and amount are longer than the entry field, the system prints two lines.

Example receipt layout

On the following page you will find a receipt with explanations on

- parameters
- settings
- the paragraphs 1 - 9
- remarks on settings for the individual ranges.

Flag “*“

All parameters flagged with “*“ can take the value [0] or [1], i.e. the
corresponding line can be switched on or off.

Flag “&“

Additionally, lines flagged with “&“ with the set parameter are only printed if there is a value available.

Flag “PTB“

Lines flagged with “PTB“ are prescribed by the calibration office and are always printed on the receipt. Only part 4: the date can be deactivated through receipt parameter 10.

```
COPY                                ERROR  x x
Document date                 dd.dd.dd   tt :tt
                DELIVERY NOTE
                    INVOICE




Customer no.                          123456

Counter no.                           000001
Measur. number                           123
Totalizer                       123456789 L
Filling date                      dd.mm.yyyy
Start of filling                       hh:mm
End of filling                         hh:mm
-------------------------------------------------
------
Driver no.                                10
Vehicle no.
Chamber no.
-------------------------------------------------
------
Preset                                200 L
Aver. temperature                  +0,3 deg.C
-------------------------------------------------
------

Product x                             Diesel
*Volume at ???                        218 L
*Volume at 15 deg.C                   214 L*
-------------------------------------------------
------

Price/100L     w/VAT                  45,10 EUR
Amount w/o VAT                        83,20 EUR

Add???

VAT    (16,0%)                        13,31 EUR
*Total                                96,51 EUR*
```

Parameter	Setting	Section	Remark
27	0…99		blanc lines 1
		1	only if necessary
		1	only if necessary
1	1	2	
2	2	2	only with registration data
1	0	2	no headline
25	0…99		blanc lines 0
3	&	3	
28	0…99		blanc lines 2
	PTB	4	
	PTB	4	
10		4	
5	*	4	
6	*	4	
21	*		separation line 1
8	&	5	
9	&	5	
10	&	5	
22	*		separation line 2
12	&	6	
13	*	6	
23	*		separation line 3
29	0…99		blanc lines 3
	PTB	7	no / Designation
19	*	7	
	PTB	7	
24	*		separation line 4
29	0…99		blanc lines 4
16	&	8	
17	&	8	
31			blanc lines 5
		9	only if necessary
32			blanc lines 6
18	&	8	
15	&	8	capital letters
			line feed after printing
26	0		without back
26	2		(starting position forward

4. Calibration of TWM 2084

4.1. Preparation

WARNING!
DANGER – EXPLOSION!

Open casing of TWM AI only 15 minutes after the system has been switched off!

1. Open casing
2. Remove keyboard and display connectors
3. Open tap of the calibration switch (4 screws)
4. Press calibration switch

Calibration mode

When activating the calibration switch, the system changes to calibration mode automatically. The decimal point position is activated as well, i.e. parameter 17 may not be set. When in calibration mode, the product selection function and the preset value are displayed.

4.2. Calibration Parameter Setting

Call up function

The main menu is displayed:

1: Filling
2: Start trip
3: Reports
4: Service

Select „Service“

1. Enter „4“ using the numeric keypad.
   The following menu is displayed:

   1: Receipt parameter
   2: Customer parameter
   3: Load par. into module
   4: Load par. into TWM

Select calibration parameter

2. To move to the menu item “calibration param.” either press the **#-key**
   or
   enter „9“ using the numeric keypad.

Load basic values

3. Enter „3“ and confirm to load the basic values.

Call up function "View / Modify"

4. Enter "1" to call up "View / Modify".

   The system displays parameter 000. The Cursor is positioned in line 1.

Par-no.:	**000**	**E**
Value:	**001,000**	
min/max:	**000,16/163,83**	

Select parameter

5. Enter the number of the parameter to be displayed and modified.

Check parameter

6. If the preset value is correct, you can select the next parameter.

Modify parameter

7. If the preset value is not correct, move the cursor to line 2 by pressing the **Enter key**. Enter the correct value in line 2.
8. After having corrected the value, press the **Enter key**.

   The cursor is again positioned in line 1. The next parameter can be called up.

Explanation of calibration parameters

Basic parameter

By loading the basic parameters (= default-values, refer to parameter list in chapter 5.1) most of the parameter settings are correct.

Calibration parameters to be set

Usually only the calibration parameters 5, 6, 21 - 29, 104 - 109, 111 – 119, the pulse frequencies (parameters 0 and 2) and with double calculators parameters 100 and 102 are to be adjusted.

In software version 1.2.0.12 the parameters for pulse frequencies have been changed: parameters 0, 2, 100, and 102 have been replaced by a table from parameter 140 to 219.

The product names can be re-defined when needed.

The correctness of all other calibration parameters is to be checked.

Parameter 4: Handling of reverse impulses

With parameter 4 the display of the reverse pulses is activated or deactivated.

Setting 0	Reverse pulses are counted back internally, but are not displayed (display stops).
Setting 1	The reserve pulses are displayed.

The number of permitted reverse pulses are configured with parameter 7.

Parameter 5: Minimum filling

For the minimum delivery quantity the following formula applies:

Minimum delivery quantity = entered value * 10 l

The default valve corresponds to a quantity of 200 l.

Parameter 6: Run-on time

The run-on time can be set with parameter 6. This may be necessary to compensate the different reaction times of shutdown valves.

The standard setting is 25, i.e. the run-on time is 2.5 seconds. The values can be set between 1 (= 0,1 s) and 250 (= 25 s).

Normally, you select the parameter (Enter „6“ + Confirm) and check whether the standard value 25 has been set.

CAUTION!

Small values (< 10) result in a direct stop of the volume meter. If it takes longer to interrupt filling due to an increased reaction time of the valve, the volume dispensed in the meantime is not measured.

Parameter 7: Number of allowed reverse impulses

Parameter 7 can take a value of 0 - 255. Default value in the program memory is 10.

Parameter 8: Sense of rotation of pulse generator

Parameter 8 is displayed with two decimal places:
Unit place for measuring system A and decimal place for measuring
system B.

- Setting 1 Pulse generator turning counterclockwise (ccw)
- Setting of 0 pulse generators turning clockwise (cw) (default value)

Parameter 9: Setting country

The setting determines currency and basic price unit (language on display and on receipt can be modified as needed with the customer parameters 155 and 165).

Parameter 10: Pulse suppression

Smallest volume indicated = entered value x 0,1 l

Parameter 11 and 12: Pulse generator power check

The maximum and minimum power of the pulse generator is calculated according to the formula in parameters 11 and 12 (see chapter 5.1.3 " pulse generators: Current check / advance suppression").

ATTENTION!
If Hectronic pulse generators are being used, the valve settings at the time of pre-calibration must not be changed.

Parameter 13: Print option counter; number and uncompensated volume

The unit place is responsible for the counter number and measuring point number (0 – 3). Default value is 0 = without printout.
The decimal place is responsible for the printout of uncompensated volume.

CAUTION!

When using a dual-measuring system the system number is to be printed!

Parameter 14: Pre-shutdown value

The pre-shutdown value is needed for systems with precise shutdown functions. Thus, the systems must use a throttle valve.Pre-set value = start of throttling when pre-shutdown value is approximated.

Parameter 15, 16, 18, 19: Price calculator function

15 Setting of the amount multiplier

16 Position of the decimal point in the amount line (dis play)

18 Position of the decimal point in the basic price line(display)

19 Smallest currency unit

Parameter 17: Position of decimal point in the display of volume

17 Decimal point position 1 forces the display to show of 1/10 litre.

Parameter 20: Valve current protection

The parameter is to be adjusted depending upon power consumption of the single solenoid valves.

Parameter 21 - 29: Product release / TVC on/ off

For each of the 9 products, it can be defined whether the product is locked and whether temperature volume compensation (TVC) is on or off. You can also allocate each of the products to one of the two pulse frequencies.

In the default configuration, the AIII-products Fuel Oil EL, Diesel and “ECO” Diesel are released and TVC is set to on. To turn off TVC for a product, set the parameter value to 1. All other products are locked in the default configuration but can be activated at any time.

Pulse frequencies for measurement side A are set using the parameter’s decimal place . Blocked products have parameter value 0. Products with a pulse frequency of 0 have a single-digit parameter value only (locking or TVC on/off). Enter 2 in the decimal place to lock the products on side A.

Using the hundred’s place, pulse frequency can be set to the dual system (calibration parameter 100 and 102). In addition, the products for measuring system B can be blocked using the hundred’s column (entry 2).

The parameter value has three digits:

- Use the units place either to lock products or to activate TVC:

- 0 Product locked
- 1 Product released, TVC is off
- 2 Product released, TVC is in according with

  DIN 51757 Procedure 2
- 3 Product released, TVC in according with

  EA5 (see *42 for Eco Diesel*)
- 4 Product released, TVC for LPG

• the decimal place is for the setting of the pulse priority of measurement side A:

- 0 pulse frequency 0
- 1 pulse frequency 2

You can also enter the value „2“ in the decimal place to lock a product (example: dispense petrol without TVC, pulse frequency 2: parameter 23 = 11).

- Use the hundred's place with a dual system to set the pulse frequencies for measurement side B:
  - 100 pulse frequency 1
  - 102 pulse frequency 2

  You can also use the hundred's place (side B) to lock a product by entering the value 2.

Parameter 30 - 47: Reference density

The default values entered during pre-calibration must be checked during final calibration.

Parameter 51 - 59: Reference temperature

Default values should be checked during calibration.

Parameter 61 – 97: Coefficients of expansion K_0 - K_1

The TWM allows to apply three separate procedures for temperature-volume compensation (TVC). Separate settings should be made for each product in calibration parameters 21-29, based on the document produced by the DIN standards committee for primary measuring equipment and designated NPM 2.8 NR. 04-94.

Setting EVM calibration parameter 21 - 29	TVC-procedure	NPM-section	Configuration needed	Configuration	Use
1	without TVC				
2	TVC acc. to DIN5175 7 Annexe B.1	E.1.3.2. Procedure 2 formula E.16 for a: E.20	Density (g/l) K_0* 102 K_1* 104	30 – 47 61 – 77 81 - 97	Fuel Oil Diesel Carburet-tor-fuel
3	TVC linear (EA5,	E.1.3.2. Procedure	K0E* 105	61 - 77	Eco Diesel (RME)

	S. 42)	1 formula E.11			
4	TMU acc. to DIN5175 7 Annexe B.2	E.1.3.2. procedure 2 prod.gr. X formula E.21	Density (g/l)	30 - 47	Liquid gas

Densities

Densities are published every two years by the mineral oil trade association and calibration offices.

K_{oe}

K_{oe} are published every two years by the mineral oil trade association and calibration offices.

K_0, K_1

K_o, K_1 corresponding to the density from DIN 51757 Table B1.

Parameter 99: Printer control

- 0 No filling receipt is generated
- 1 Filling receipt is always printed (default value) TM290/ TM295 (over keyboard TWM)
- 2 Delivery receipt, is released over the PC (Truck-Data-Link), and created on the LQ-570.
- 3 Filling receipt is created on the LQ-570 (over keyboard TWM).
- 4 Epson TM-U295 with printer control gear

Parameter 100, 102, 104: Pulse frequency measurement side B

In software 2084.75.100.21 Parameters 100 and 102 determine the impulse frequency for measurement side B, see *parameters 21 - 29 (hundreds place).*

104 Parameter 104 determines the max. Pulse difference of the pulse frequency.

Parameter 105 - 107: Throttling during beginning of delivery / bypass control

105 Throttling with beginning of delivery [litre], controlled over the output „pre-shutdown valve“

106 Bypass Control

- Setting 0 for bypass not active
- Setting 1 (flow > threshold value) and 2 (flow < threshold value) for bypass active

107 Bypass threshold for flow in 10 l/min. Flow limitation on 200 l/min (valve control).

Parameter 108: Pulse generator input

Parameter 108 defines the pull up (value = 1) / pull down (value = 0) resistance at the pulse generator input (default value is pull up).

Parameter 109: Filling up protection AFS 60

The parameter has 3 places:

- the unit place for valve outlet AFS 60
  - 0 = no function
  - 1 = Free fall delivery Output 0, pump delivery Output 1
  - 2 = Free fall delivery Output 1, pump delivery Output 0
  - 3 = fixed allocation; Output 0 for measurement side A and output 1 for measurement side B.
- the decimal place for measurement side A
  - 0 = Pump delivery
  - 1 = Free fall delivery
  - 2 = Menu controlled
- the hundreds place for measurement side B
  - 0 = Pump delivery
  - 1 = Free fall delivery
  - 2 = Menu controlled

Parameter 110: Configuration of the AFS 60

Parameter 110 defines the control of the filling amount over AFS 60:

- 0 = without AFS 60
- 1 = one AFS 60 (parallel delivery with double com puter not possible)
- 2 = two AFS 60 (parallel delivery possible)
- 3 = LRC radio anti spill system with integrated deliv ery control
- 4 = LRC radio frequency anti spill system can be used as a remote control unit for bypassing (only Autria).
- 5 = LRC radio overfill security system continue delivery after short submersion

Parameter 111:

The Baud rate can be regulated 0=4800 1=9600.

Parameter 112:

Defines the printout on the receipt of the error message operating with an overfill protection system (0 = not printed / 1 = printed).

Parameter 120: Anti spill security

Stopping valve can be regulated in 0,1 litres.

Parameter 121 – 219: Product designations

For all 11 places per product letters, digits and special characters may be used

CAUTION!

Parameters 121-219 are pre-defined after product designations(product number 1 to 9) **up to and including program version 6!**

ATTENTION!

Starting with program version 7 the product designation has been removed from calibration parameters 121 - 209. The product designation (product name) is set in the main menu "4 service", submenu 8. It is still being printed with the calibration parameters report.

For storing the product designations a separate parameter module is necessary!

The former submenu 8 " measuring No. = 1 " is newly found newly in the submenu 0 " automatic calibration ".

Parameter 220 - 233: Counter / measuring System number

Both inputs can contain alpha character (letter) and/or digits. Thus the vehicle licence plate can be entered as the vehicle identification number.

- The counter number has a maximum of 6 digits.
- The measuring system number has a maximum of 255 digits.
- The vehicle number has a maximum length of 9 digits.

The numbers 111 - 119 res. 220 - 233 are for system internal use only (one number per digit). For parameter selection only enter the first number of the corresponding range (111). Selection can also be made by pressing the **#-/ *-keys.**

The following display appears:

Par-no: 220 -233 E

• •

K=capital, B=spec. Char.

***=left, #=right**

Entry range

K = **Clear key** for Capital letters

B = **Print key** for special characters ä, ö, ü, ***-/ #-keys** for cursor

The dots at the left and right of line 2 determine the entry field.

Parameter 234 - 240: Additive pump control

Parameters 234 - 240 define the control of an additive pump and may be stored and recovered from the parameter module.

234 Activate [1]/ Deactivate [0] Additive pump

235 Injection amount determination of the [litres]

237 max time for each dosing cycle. [0,1 s]

238 minimum period spent at the piston resting position [0,1 s]

239 minimum period spent at the piston end position [0,1 s]

240 Hose and measuring chamber volume [litres]

4.2.1. Rules for Character Entry

Four characters have been assigned to each key (standard: 1 number, 3 letters):

- The first keystroke calls up the number.
- All further keystrokes calls up the next character available.
- After the fourth keystroke the numbers is displayed again.
- For capital letters press the **Clear- key** after having selected the desired character.
- Press the **Print key** to generate special characters (ä, ö, ü, .) after having selected the corresponding character (a, o, u, -)
- Press the **0-key** to generate special characters (:, *).
- After having selected the correct character, press the **#-key** to move to the next entry field. Then enter the 2nd character.
- Blanks: Press the **#-key** without selecting a character.
- To delete characters move to the cursor to the desired character (***-key** backward, **# -Taste** forward) and press the **0-key** once.

Refer to the following table for the complete character set and the key layout.

Character set and key layout for entering vehicle and counter numbers

Key	How often	+ print key	+ clear key
Key 1	1 x = 1 2 x = a 3 x = b 4 x = c	ä	 A B C
Key 2	1 x = 2 2 x = d 3 x = e 4 x = f		 D E F
Key 3	1 x = 3 2 x = g 3 x = h 4 x = i		 G H I
Key 4	1 x = 4 2 x = j 3 x = k 4 x = l		 J K L

Key 5	1 x = 5 2 x = m 3 x = n 4 x = o	ö	M N O
Key 6	1 x = 6 2 x = p 3 x = q 4 x = r		P Q R
Key 7	1 x = 7 2 x = s 3 x = t 4 x = u	ü	S T U
Key 8	1 x = 8 2 x = v 3 x = w 4 x = x		V W X
Key 9	1 x = 9 2 x = y 3 x = z 4 x = -	.	Y Z
Key 0	1 x = 0 2 x = blank 3 x = * 4 x = ,		

Tab 4-1: Character set and key for entering vehicle and counter numbers

Example for entering a license plate number

As vehicle identification number the number “VS-B 123” is to be configured.

Entry	Display/ Result
8 8 Clear #	8 v V Cursor moves to the next column
7 7 Clear #	7 s S Cursor moves to the next column
9 9 9 9 #	9 y z - Cursor moves to the next column
1 1 1 Clear #	1 a b B Cursor moves to the next column
#	Blank: Cursor moves to the next column
1 #	1 Blank: Cursor moves to the next column
2 #	2 Blank: Cursor moves to the next column
3 #	3 Blank: Cursor moves to the next column
Confirmation	Cursor moves to line 1: Entry has been adopted

Tab 4-2: Example for entering a license number

Numerical entry

For numerical entries enter the first figure and then press the **#-key**. The same applies to all following figures. On completion press the **Enter-key.**

4.2.2 Modification of Product Names

Starting from program version 2084.75.100.07

Under **4: Service**

Submenu **8: Product designation**

1: show / modify

The following product names (max: 16 digits are pre-set in the system:

The product names can be modified only in the calibration mode.

- Product 1: Fuel Oil EL
- Product 2: Diesel
- Product 3: Unleaded fuel
- Product 4: Leaded Super
- Product 5: Unleaded Super
- Product 6: Super Plus
- Product 7: LPG
- Product 8: not allocated
- Product 9: Eco Diesel RME

Proceed till (and incl.) program version 2084.75.100. 07

1. To modify a product name select the corresponding name 1 – 9 (e. g. 1 for Fuel Oil EL).
2. The name displayed may now be overwritten and saved by confirmation.

The characters are entered as described for vehicle or counter numbers (refer to chapter 4.2.1).

The only difference is that the first keystroke does not generate a number but the first letter, since letters have priority over the numbers when entering the product name. To call up a number press the key four times.

Refer to the following table for the complete character set and the key layout.

For storing the product destinations a separate parameter module is necessary!

Product name:

1: show/modify

2: load on the module

3: load on the TWM

The product names are printed out with the calibration parameter

ATTENTION

Up to program version 2084.75.100.07 the product names are stored using calibration parameters 121-219.

Character set and key layout for entering products

Character set and key layout for entering products

Key	How often	+ receipt key	+ clear key
Key 1	1 x = a 2 x = b 3 x = c 4 x = 1	ä	A B C
Key 2	1 x = d 2 x = e 3 x = f 4 x = 2		D E F
Key 3	1 x = g 2 x = h 3 x = i 4 x = 3		G H I
Key 4	1 x = j 2 x = k 3 x = l 4 x = 4		J K L
Key 5	1 x = m 2 x = n 3 x = o 4 x = 5	ö	M N O
Key 6	1 x = p 2 x = q 3 x = r 4 x = 6		P Q R
Key 7	1 x = s 2 x = t 3 x = u 4 x = 7	ü	S T U
Key 8	1 x = v 2 x = w 3 x = x 4 x = 8		V W X
Key 9	1 x = y 2 x = z 3 x = - 4 x = 9	.	Y Z
Key 0	1 x = blank 2 x = * 3 x = , 4 x = 0		

Tab 4-3: Character set and key layout for entering products

Procedure for software 2084.75.100.21:

The calibrated filling may now be started.

Perform calibrated filling

9. Enter “1“ to call up filling function.

   The system is preparing the filling. In calibration mode, only product selection and pre-set function are active.

10. Enter the product number.

    The product name is automatically displayed (e.g. Fuel oil EL).

Allocate product name

11. Select the individual products by pressing **#-key** or ***-key**.

12. To select the required product press the **Enter key**.

Starting calibrated filling

13. Press the **Enter key** twice to skip volume preset and start filling.

14. Start filling.

    During filling you can automatically display the compensated volume (large figures), the rate of flow in litres per minute, the temperature in °C, the uncompensated volume (last line) and the pulse frequency.

15. Stop filling by pressing the **Exit key**.

16. There are two ways to determine the pulse frequency (pulse per litre):

    - automatic computing *(see chapter 4.3.1).*
    - manual input (*see chapter 4.3.2*)

4.3.1 Calibrated Filling and Pulse Frequency Setting

1. Print the receipt by pressing the **Print key**.
2. Press the **Exit key** to return to the main menu after printing is completed.
3. Enter „4“ using the numeric keypad to call up „Service“.

   The following menu is displayed:

   1: Receipt parameter
   2: Customer parameter
   3: Load par. into module
   4: Load par. into TWM

4. To select the menu option press the **# key** several times or enter „0“ via the numeric keypad to call up „Automatic calibration“.

   The following display appears

   Uncomp. volume
   Measured: 00280,8 l
   Correct uncomp.
   Volume: 01000,0 l

   The cursor is positioned on line 4, ready to enter the correct volume.

5. Enter the volume of the calibration container. This value can be deleted using the **Clear key**. Please note that preceeding zeros have to be entered.
6. After having entered the correct volume, press the **Enter key**.

   The system calculates the pulse frequency factor automatically. The pulse frequency (0 or 2) is allocated according to the settings of parameters 21 to 29.

   If fuel oil El was selected for the calibrated delivery and the impulse frequency “0” was assigned in parameter 21, then the automatic measurement takes place likewise with impulse frequency ”0”.

Pulse frequency 2

The same procedure applies to pulse frequency 2.

The following display appears:

Par-no: 000 E
Value: 00,976736

ok?

7. Press the **Enter key** to adopt the value displayed.
8. Press the **Exit key** to return to the main menu.

4.3.2 Option 2 - Determine Pulse Frequency: Manual Calibration

When selecting this option, you have to determine the pulse frequency yourself. First perform the calibration filling.

You need the value in line 4 for the uncompensated volume and the value of the current (old) pulse frequency.

The correct (new) pulse frequency is calculated according to the following formula:

Calculation of the new pulse frequency

$$\text{New pulse frequency} = \frac{\text{Old pulse frequency} * \text{uncompensated volume displ.}}{\text{Actual uncompensated volume}}$$

9. Print the receipt by pressing the **Print key**.
10. Press the **Exit key** to return to the main menu.
11. To set the correct pulse frequency enter „4“ to select „Service“ from the main menu.
12. Enter „9“ to call up the calibrations parameters.
13. Enter „1“ to call up „View / Modify“.

    The system displays parameter 000. This parameter is used to set the pulse frequency.
14. Press the **Enter key** to move to line 2.
15. Enter the calculated value with on preceding zero and 3 decimals. The last 3 digits are entered by pressing * for backward or # for forward.
16. After having entered the correct value press the **Enter key**.
17. To return to the main menu press the **Exit key** several times.

Procedure for software 1.2.0.12:

For dynamic calibration each of the former parameters 0, 2, 100, and 102 has been replaced by a set of five correction factors and five corresponding flow rate values.

Parameter table layout:

	Correction factor 1	Flow rate value	Correction factor 2	Flow rate value
Side A	EP140	EP180	EP150	EP190
	EP142	EP182	EP152	EP192
	EP144	EP184	EP154	EP194
	EP146	EP186	EP156	EP196
	EP148	EP188	EP158	EP198
Side B	EP160	EP200	EP170	EP210
	EP162	EP202	EP172	EP212
	EP164	EP204	EP174	EP214
	EP166	EP206	EP176	EP216
	EP168	EP208	EP178	EP218

First calibration parameters 21 to 29 should be set up as usual.
Then the above mentioned parameter table has to be reset to defaults.
This is done by selecting menu item

(4) → (0) → (1) start automatic calibration

After that, confirm „reset correction factors ?“.

The software then resets the correction factors (Parameters 140 to 178) to 1.000 and the corresponding flow rate values (Parameters 180 to 218) to 0.

Now test dispensings can be done. In this state the software calculates with a constant factor of 1.000.

If the operator intends to store just one average value (previous calibration method), there are two input possibilities:

1. Calculation by TWM-software
   (menu item (4) → (0) → (2) volume input)

2. input of the correction factor
   (menu item (4) → (9) → (1) view/modify calibration parameters)

   In this case, mind the changed parameter addresses:

	Old par.	New par.
Side A, corr.factor 1	0	140
Side A, corr.factor 2	2	150
Side B, corr.factor 1	100	160
Side B, corr.factor 2	102	170

If there is only one correction factor per product and measuring system, it will be used for all flow rates. Thus it is not necessary to change the corresponding flow values.

For dynamic calibration with more than one correction factor per product and measuring system, the factor should be calculated and inserted into the table by software.

After the filling, select menu item (4) → (0) → (2) volume input

So at least one filling per product must be done, up to five fillings are possible.

If more than one correction factor is stored, the pairs of values will be sorted by the software.
The manual input of correction factors and flow values would be possible, but is not recommended.

Terminating the calibration process is done by selecting menu item

(4) → (0) → (1) exit automatic calibration

After that the software will use the stored values.

To test the correct function of this feature, a filling can be done with calibration switch still activated. The software will then display the currently used, flow rate dependent correction factor.

4.4. Country Settings

The basic configuration of the system contains the German settings for currency, decimal point position and currency multiple. These settings can be modified for use in other countries.

Parameter 9: Allocation of country

This parameter selects the country, with currency, VAT text and basic price unit being set automatically. The currency sign for Dollar can be set for all countries (except Germany and Hungary) using allocation 11.

Parameter 15: Amount multiplier

When changing the number of decimals for the basic price, the multiplier „Basic price * Amount“ has to be modified in some cases. Using parameter 15 the amount can be shifted one digit to the right or to the left.

Parameter 16 - 18: Decimal point position

Using these parameters the number of decimals with regard to amount, volume and basic price can be changed.

Parameter 19: Smallest currency multiple

This parameter allows you to set the smallest currency unit and use for example, increments of 5 instead of the usual increments of 1, where 1 is the smallest currency unit.

Parameter 5, 7, 13

These parameters have to be set in accordance with national calibration regulation:

5 Minimum volume to be dispensed

7 Number of reverse pulses permitted

13 Print of uncompensated volume

Parameter 121 – 219

These parameters are used to set the product names in non-German-speaking countries.

Customer parameter: 155, 165 and 204, 206, 208

Additionally the following customer parameters have to be set:

155 Dialogue language

165 Receipt language

204, 206, 208 VAT rate

4.5. Terminate Calibration

To repeat filling select function “1: Filling“ and repeat calibration filling.

If all settings are correct, run the following functions:

Simulation of impulse errors (Requirement of the Austrian institute of metrology)

When pressing the key sequence 1 - 3 - 9 during filling a pulse interruption is simulated and filling interrupted (Err 81 is displayed).

Set current number for measurement to „1“

This function resets the current measurement number to 1 (i.e. receipt numbering starts with 1).

1. Enter “4“ in the main menu to select “Service“.
2. To view the service function press the **# key** twice and page through the display.
3. Enter “0” in the “Service“ menu and afterwards enter " 2 " in order to execute the function “measuring No = 1".
4. Press the **Exit key** to return to the main menu.

Delete totalizers

1. Enter „3“ in the main menu to select „Reports“.
2. Enter „2“ to call up function totalizers.
3. Enter „4“ to delete the totalizers (this function is not visible on the display).
4. Press the **Exit key** several times to return to the main menu.

Print calibration parameters

1. Enter „4“ in the main menu to select „Service“ from the main menu and than enter „9“.
2. Enter „2“ to print the calibration parameters.

Close and seal system

After all entries have been completed, the system can be closed and sealed with the following steps:

1. Switch off the calibration switch (left switch position).
2. Check the calibration switch function by calling up the „Service“ functions 0 and 9.
   To do so select function „4: Service“ from the main menu and

- Enter „0“ for „Calibration“ and afterwards
  - enter„1“ for „Automatic calibration“.
    The system displays „Calibration switch off“.
  - Enter „2“ for „Measur. No. = 1“.
    The system displays „Calibration switch off“.
- Enter „9“ for „Calibration parameter“ and then „1“ to call up „View / Modify“.

The system displays the calibration parameters which can now be printed. When pressing the **Enter key** to modify the value in line 2 the message „Calibration switch off“ appears. The same applies when entering „3“ (load basic parameters).

3. The system can now be sealed and closed (*see chapter 12.* „Sealing plans TWM“).
4. Adjust the receipt and customer parameters in accor dance with the desires of the operator.
5. Print the corresponding parameter lists.
6. Load all parameters into the parameter module.

   Please refer to the operating manual for a more de tailed description of these functions.

5. Parameter Lists

5.1. Calibration Parameters

Abbreviations

The following abbreviations are used in the calibration parameter tables:

- No. Parameter number
- Min minimum Parameter value
- Max maximum Parameter value
- def default value

5.1.1 Parameter for Measurement Side A and B

No.	min	max	default	Description
0	000,1600	163,83000	001,00000	Pulse frequency 0 for Measurement side A
2	000,1600	163,83000	001,00000	Pulse frequency 2 for Measurement side A
				Pulse frequency for Measurement side B refer to parameter 100 and 102!
4	0	1	0	View of reverse pulses 0 = internally back-counted (without display) 1 = internally back-counted (with display) *Number of allowed reverse pulses see parameter 7*
5	1	250	20	Min. volume dispensed = Value * 10 l; The temperature is measured after each tenth of the minimum volume defined.
6	1	250	25	Run-on time after filling has stopped; Parameter value * 0,1 s; basic value 2,5 s
7	0	255	10	Number of reverse pulses permitted
8	0	11	0	Direction of rotation: Pulse generator Number places separate for each measurement side - unit place for Measurement side A - decimal place for Measurement side B 0 = Direction of rotation clockwise (cw) 1 = Direction of rotation counter clockwise(ccw) Example: Input value " 10 ", direction of rotation in Measurement side A = cw and B = ccw.

Tab 5-1: Calibration parameters: Parameters for Measurement side A and B

5.1.2 Allocation of country

No.	min	max	default	Description
9	0	7	0	Allocation of country: influences the currency as well as the basic price unit. 0 = Germany € €/100 l 1 = Great Britain £ £/100 l 2 = Spain € €/100 l 3 = France € €/100 l 4 = Switzerland Fr Fr/100 l 5 = Austria € €/100 l 6 = Hungary Ft Ft/100 l 7 = Belgium € €/100 l 8 = Czech. Rep. Kc Kc/100 l 9 = Italy € €/100 l 10 =Croatia Kn Kn/100 l 11 =Countries with $-currency sign 12 =Netherlands € €/100 l 13 =Slovenia € €/100 l 14 =Poland Zl Zl/100 l

Tab 5-2: Calibration parameters: Allocation of country

CAUTION!

Use customer parameters 155 and 165 to select the display and receipt language!

5.1.3 Pulse Generator: Power Control / Pulse Suppression

No.	min	max	default	Description
10	0	100	0	Pulse suppression: Smallest volume indicated = entered value * 0,1 l
11	0	255	141	**Power control** - parameter for maximum current: Basic value $I_{max.}$ = 85 mA Calculation of entry value for maximum current in [mA]: Entry value $I_{max.}$ = 255 mA - (power in mA * 1,34) Example: 255 - (85 * 1,34) = 141 mA
12	0	255	231	**Power control** - Parameter for minimum current Basic value I_{min} = 18 mA Calculation of entry value for minimum current in [mA]: Entry value $I_{min.}$ = 255 mA - (Power in mA * 1,34) Example: 255 - (18 * 1,34) = 231 mA
			169	**Installations with Namur or C7/14 require the value 169 in order to improve the recognition of channel interruptions.**

Tab 5-3: Calibration parameters: Power control / Pulse suppression of pulse generator

5.1.4 Pulse Generator: Power Control / Pulse Suppression

No.	min	max	default	Description
13	1	13	1	Print counter and measuring system number – entry using unit's place: 0 = not printed 1 = print counter number 2 = print measuring system number (must be printed in case of dual system) 3 = print counter and measuring system number Print uncompensated volume – entry using decimal place: 0 = uncompensated volume cannot be printed 1 = uncompensated volume may be printed If parameter value = 1, this line is printed or not depending on receipt parameter 19.
14	2	100	5	Pre-shutdown value: Start of throttling when preset value in litres is approximated.

Tab 5-4: Calibration parameters: Print Measuring System/ Counter number/ Uncompensated Volume/ Pre-Shutdown Value

5.1.5 Price Calculator Paramters

No.	min	max	default	Description
15	0	2	1	Amount multiplier: 0 = shift amount one digit to the left 1 = standard settings for Germany 2 = shift amount one digit to the right
16	0	2	2	Decimal point position in amount line on the LC display: Enter the number of decimal places
17	0	22	0	Decimal point position in volume line on the LC display: - input unit place; Quantity display [L] 0 = 6- digits without comma 1 = 5- digits with 1 post-decimal position 2 = 7- digits without comma *With activated calibration switch the TWM switches to 5digits with 1 post-decimal position litre display* - input decimal place; Measuring quantity [?] 0 = L [Litre] 1 = m^3 [Cubic meter] 2 = Kg [Kilogram]
18	0	22	12	Decimal point position in basic price line on the LC display: - Enter the number of decimal places 0 = without 1 = one-digit 2 = two places - Input decimal place; Quantity unit 0 = per 1000 units (eg. price/1000 l). 1 = per 100 units 2 = per 10 units 3 = per 1 unit
19	1	100	1	Smallest currency multiple

Tab 5-5: Calibration parameter: Price Calculator Parameters

5.1.6 Parameter for Valve Current Protection

No.	min	max	default	Description
20	1	3	0	Maximum valve current (electronic fuse): 0 = 0,25 A 1 = 0,50 A 2 = 0,75 A 3 = 1,00 A

Tab 5-6: Parameter calibration: Parameter for Valve Current Protection

5.1.7 Product Release and Temperature Volume Compensation (TVC) / Product-related Pulse Frequency Allocation

No.	min	max	default	Description
21	0	224	2	Units place: 0 = Prod. 1 blocked 1 = Prod. 1 released, TVC inactive 2 = Prod. 1 released, TVC according to DIN 51757, B1/ B2 3 = Prod. 1 released, TVC according to EA5, (see 47 for Eco Diesel anw.) 4 = Prod. 1 released, TVC for Liquid gas (product group 7) Decimal place: 0 = Prod. 1 Pulse frequency 0 (calibration parameter 0) 1 = Prod. 1 Pulse frequency (Calibration parameter 2) 2 = Prod. 1 blocked for measurement side A Hundred's place for measurement side B (dual system): 0 = Prod. 1 Pulse frequency 100 (calibration parameter 100) 1 = Prod. 1 Pulse frequency 102 (calibration parameter 102) 2 = Prod. 1 blocked for measurement side B
21	0	224	2	Product 1 Fuel oil
22	0	224	2	Product 2 Diesel
23	0	224	0	Product 3 Unleaded fuel
24	0	224	0	Product 4 Leaded Super
25	0	224	0	Product 5 Unleaded Super
26	0	224	0	Product 6 Super plus
27	0	224	0	Product 7 Liquid gas
28	0	224	0	Product 8 (not allocated)
29	0	224	3	Product 9 Eco Diesel

Tab 5-7: Calibration parameters: Product Release and Temperature Volume Compensation/ Product-related Pulse Frequency Allocation

5.1.8 Reference Density

The values are entered in grams per litre or kilograms per m^3.

No.	min	max	default	Description
30	0	1	0	Function reference density: 0 = Reference density preset and not changeable 1 = Reference density can be entered by the user and printed on the receipt (not for Germany)
31	500	1200	846,0	Reference density Prod. 1 (Fuel oil)
33	500	1200	836,0	Reference density Prod. 2 (Diesel)
35	500	1200	736,0	Reference density Prod. 3 (Unleaded fuel)
37	500	1200	836,0	Reference density Prod. 4
39	500	1200	748,0	Reference density Prod. 5 (Unleaded Super)
41	500	1200	751,0	Reference density Prod. 6 (Super plus)
43	500	1200	600,0	Reference density Prod. 7 (Liquid gas)
45	500	1200	846,0	Reference density Prod. 8
47	500	1200	831,0	Reference density Prod. 9 (Eco Diesel, RME) (no density value required)

5.1.9 Reference Temperature

No.	min	max	default	Description
51	10	50	15	Reference temperature Product 1
52	10	50	15	Reference temperature Product 2
53	10	50	15	Reference temperature Product 3
54	10	50	15	Reference temperature Product 4
55	10	50	15	Reference temperature Product 5
56	10	50	15	Reference temperature Product 6
57	10	50	15	Reference temperature Product 7
58	10	50	15	Reference temperature Product 8
59	10	50	15	Reference temperature Product 9

Tab 5-8: Calibration parameters: Reference temperature

5.1.10 Coefficient of Expansion K_0

Enter value * 10^2 for K_0
Enter value * 10^5 for K_{0E} (not DIN).

No.	min	max	default	Description
61	0	65535	18697	K_0 Product 1 (def. for Fuel oil)
63	0	65535	59454	K_0 Product 2 (def. For Diesel)
65	0	65535	34642	K_0 Product 3 (def. for Unleaded fuel)
67	0	65535	59454	K_0 Product 4
69	0	65535	34642	K_0 Product 5 (def. for Unleaded Super)
71	0	65535	34642	K_0 Product 6 (def. for Super plus)
73	0	65535	0	K_0 Product 7 (def. for Liquid gas); K_0 for liquid gas is without meaning
75	0	65535	34642	K_0 Product 8
77	0	65535	0,86	K_{0E} Product 9 (Eco Diesel, RME)

Tab 5-9: Calibration parameters: Coefficient of Expansion K_0

5.1.11 Coefficient of Expansion K_1

Enter value * 10^4 for K_1.

No.	min	max	default	Description
81	0	65535	4862	K_1 Product 1 (def. for Fuel oil)
83	0	65535	0	K_1 Product 2 (def. for Diesel)
85	0	65535	4388	K_1 Product 3 (def. for Unleaded fuel)
87	0	65535	0	K_1 Product 4
89	0	65535	4388	K_1 Product 5 (def. for Unleaded Super)
91	0	65535	4388	K_1 Product 6 (def. for Super plus)
93	0	65535	0	K_1 Product 7 (def. for Liquid gas); K_1 for liquid gas is without meaning
95	0	65535	4388	K_1 Product 8
97	0	65535	0	K_1 Product 9 (Eco Diesel RME)

Tab 5-10: Calibration parameters: Coefficient of Expansion K_1

5.1.12 Printer Control (Starting with Program Version 5)

No.	min	max	default	Description
99	0	255	1	Function receipt print: 0 = no filling receipt 1 = for printer TM290/ TM295: receipt print is triggered through keypad TWM (def.) 2 = for printer LQ-570+: receipt print is triggered through PC (Truck-Data-Link) 3 = for printer LQ-570+: receipt print is triggered through keypad TWM 4 = for printer TM U295 (from version 2084.02 002 01) in connection to a printer control gear (printer dongle 2084.72 031 10).

Tab 5-11: Calibration parameters: Printer control

5.1.13 Pulse Frequencies for Measurement Side B

No.	min	max	default	Description
100	000,16000	163,83000	001,00000	Pulse Frequency 1 for Measurement side B
102	000,16000	163,83000	001,00000	Pulse Frequency 2 for Measurement side B
104	2	40	2	max impulse difference

Tab 5-12: Calibration parameters: Pulse Frequencies for Measurement side B

5.1.14 Bypass Control System (Starting with Program Version 5)

No.	min	max	default	Description
105	0	100	0	Throttling on begin of delivery controlled using the connection for the throttling valve.
106	0	2	0	0 = Bypass off 1 = Bypass- on, if flow rate inferior to threshold value entered 2 = Bypass on, if flow rate superior to threshold value entered
107	2	100	20	Bypass-threshold for flow rate in 10 l/min; also used for valve control to limit the flow to 200 l/min (def. by law)

Tab 5-13: Calibration parameters: Bypass Control System

5.1.15 Pulse Generator Entry (Starting with Program Version 5)

No.	min	max	default	Description
108	0	1	1	Pull up-/ Pull down pulse generator entry resistance 0 = Pull down resistance 1 = Pull up resistance (def. value)

Tab 5-14: Calibration parameters: Pulse Generator Entry

5.1.16 Overfill Prevention System (Starting with Program Version 5)

No.	min	max	default	Description
109	0	223	12	Pump (PA)or free fall (FA) delivery for each measurement side. The parameter has 3 places: - the unit place for valve outlet AFS 60 0 = no function 1 = FA Output0, PA Output1 2 = FA Output1, PA Output0 3 = fixed allocation; Output 0 for Measurement side A and Output 1 for Measurement side B - the decimal place for Measurement side A 0 = pump filling 1 = free fall delivery 2 = Menu controlled delivery - the hundred's place Measurement side B 0 = Pump filling 1 = free fall delivery 2 = Menu controlled delivery
110	0	3	0	Configuration of AFS 60: 0 = without AFS 60 1 = one AFS 60 (parallel filling with dual system not possible) 2 = two AFS 60 (parallel filling possible) Control of the signal horn is done using the output shutdown valve (Switzerland) 3 = LRC radio-overfill security system with integrated control of delivery channel 4 = LRC radio overfill security system with possibility of bypassing (only Austria) 5 = LRC radio overfill security system continue delivery after short submersion
112	0	1	0	Print out of all error messages on the receipt 0= not printed 1= printed

Tab 5-15: Calibration parameters: Overfill Prevention System

5.1.17 Hectour

Starting from program version 10: Baud Rate setting

No.	min	Max	default	Description
111	0	1	0	Baud Rate 0 = 4800 1 = 9600 with setting 1 the switch 7 must be placed on off at the printer TM-295

Tab 5-16: Calibration parameters: Hectour

5.1.18 Valve turn off control

No.	min	Max	Default	Description
120	0	200	0	Automatic advance of the valve turn off value to meet the preset value, Range of adaption in 0.1 liter steps.

Tab 5-17: Calibration parameters: overfill protection

5.1.19 Integrated Delivery Control

Starting with program version 2084.75.100.12

Combination of valve outputs to delivery channels.

With parameter 130 = 0 the valves are controlled as usual.

Values > 0 activate the function and enable certain delivery ways.

No.	min	max	default	Type of delivery allocation
130	0	127	0	Input is done by pressing the number-keys according to the desired delivery way. A “+” indicates an enabled, A “-” a disabled delivery way.
131 - 139	0	127	0	These parameters assign the delivery ways (that are enabled in parameter 130) to a product (1-9). The input procedure is identical to parameter 130.

No.	min	max	default	Type of delivery allocation
131	1	042	2+ / 4+ / 6+	Fuel Oil **Delivery way selected** 2+ = Full hose 2 4+ = Bypass 2 6+ = not measured 1 The delivery ways 1 / 3 / 5 and 7 are set on minus (-) and are thus not selectable.

Tab 5-18: Calibration parameters: Integrated delivery control

5.1.20 Special Features for Preselection / Printout (Starting with Program Version 8

No.	min	max	Def.	Description
121	0	2	0	0 = default value 1 = for RK Hungary: - input and display uncompensated (because of filling up) - Calculation and printout compensated. - Printout of the preselect value uncompensated. 2 = for systems with liquid gas: - Preselection, display and printout uncompensated - Printout of the average temperature using calibration paramter13 possible *(TVC does have to be activated, parameter13-decimal place has no influence)*

Tab 5-19: Calibration parameters: Special features preselection / printout

5.1.21 Counter Number Measurement Side A

No.	Def.	Description
220	0	Counter number (6 digits): Figures, characters and special characters are permitted.

Tab 5-20: Calibration parameters: Counter Number Measurement side A

5.1.22 Counter Number Measurement Side B

No.	Def.	Description
226	0	Counter number of 6 digits: Figures, characters and special characters are permitted.

Tab 5-21: Calibration parameters: Counter Number Measurement side B

5.1.23 Measuring System Number

No.	min	max	Def.	Description
232	0	255	1	Measuring system side A
233	0	255	2	Measuring system side B

Tab 5-22: Calibration parameters: Measuring System Number

5.1.24 Control Additive Pump

No.	min	max	Def.	Description
234	0	3	0	Additive pump: 0 =not configured (pump located before the measuring system) 1 =active (Blackmer, PreciMix Haar or Sening) 2 =active (Fa. Haar) 3 =not used
235	0	1,6	0,0500000	Injection amount in Litre
237	10	99	70	max. time for each dosing pump cycle [0,1 s] PreceMix from Haar =25
238	2	8	2	min period of piston in resting position [0,1 s] Input " 0 " for additive pump HYROLEC *(starting with program version 8)*
239	2	8	2	min period of piston in end position [0,1 s] Input " 0 " for additive pump HYROLEC *(starting with program version 8)*
240	0	100	50	Hose and measuring chamber volume [Litre]

Tab 5-23: Calibration parameters: Control Additive pump

5.2. Parameter Lists Customer Parameters

Abbreviations The following abbreviations are used in the calibration parameter tables:

- No. Parameter number
- min minimum parameter value
- max maximum parameter value
- def. default value
- Prod. Product

5.2.1. Operating Parameters

No.	min	max	Def.	Description
150	0	1	1	Price calculator function: 0 = off 1 = on, to activate price calculator enter basic price
151	0	1	0	Basic price entry: 0 = without VAT 1 = with VAT
152	1	4	2	Time interval between flow measurements in s: Longer intervals result in fewer display updates and more exact measuring values
153	0	3	2	Contrast of display for system with serial numbers inferior to no. 314 and dual system number no. 174: 1 = low 3 = high
153	0	31	17	Contrast of display may be fine-tuned (starting with system no. 315 and dual system no. 175) 7 = low 31 = high
154	0	3	1	Keystroke sensitivity: 0 = low 3 = high
155	0	10	0	Dialogue language: The pound symbol can be displayed for all languages except German and Hungarian. 0 = German 1 = Italian 2 = French 3 = English 4 = Spanish 5 = Hungarian 6 = Czech 7 = Croatian 8 = Dutch 9 = Slovenian 10 = Polish
156	0	8	4	Customer number: 0 = no entry 3 – 8 = number of digits 3 = minimum 8 = maximum

No.	min	max	Def.	Description
157	0	6	3	Driver number: 0 = no entry of driver number on start of trip 1 – 6 = number of digits 1 = minimum 6 = maximum
158	0	1	1	Paper feed function 0 = inactive; when 2 EVM on 1 printer 1 = active; (default setting)
159	5	40	10	Time, until EVM system shutdown (in minutes): 0 = Function inactive 5 - 40 = minutes
160	0	1	0	Release of control switch: 0 = Pulse release on end of filling 3 sec. 1 = permanent (except during filling)
161	0	3	0	Start of trip, trip report: 0 = Start of trip not obligatory; no print request 1 = Start of trip not obligatory; print request after 50 fillings- or after completion of trip 2 = Start of trip obligatory; no print request 3 = Start of trip not obligatory; print request after 50 fillings- or after completion of trip
162	0	23	1	Preset: - Unit's place 0 = no pre-set possible 1 = Volume pre-set possible 2 = Amount pre-set possible 3 = Volume or amount pre-set possible Decimals place 0 = no renewed pre-selection with continued delivery 1 = if initial delivery was done with preselection, the calibration is done likewise (value to be added). 2 = as is the case for " 1 ", the new preselect value how ever interpreted as overall total (and not added to initial value).
163	0	2	1	Flow rate: 0 = not displayed 1 = displayed 2 = Display request with # key
164	0	2	2	Current product temperature: 0 =not displayed 1 =displayed 2 =Display request with # key
165	0	99	99	Selection of receipt language: 0-10 = Languages as customer parameter (refer to parameter 155) 11–97 = not allocated (effect like 98) 98 = can be selected before print of filling receipt 99 = like user language
166	1	4	1	Selection of receipt type: 1 = Receipt type 1 2 = Receipt type 2 3 = Receipt type 3 4 = can be selected before print of receipt
167	0	65000	0	Maximum volume to be dispensed [Litre]: 0 = without delimitation
169	0	8	0	Printer TM 295 Shift the casting to the left side
170	0	1	0	Activate ANA function 0 = non activated 1 = activated

No.	min	max	Def.	Description
171			0	Vehicle number (9 digits): Figures, characters and special characters are permitted Program version <10 the vehicle number has to be stored using calibration parameter 110
180	0	50000	1	Invoice number: 0 = no invoice number 1 = Invoice numbering limited to 50 000 modification of this parameter invoice numbering starts with this value and is in creased with each invoice printed by 1. After 50 000 numbering restart on 1.
183	0	1	1	Configuration: 0 = Single system (also with dual system) 1 = automatic identification, filling (through single and dual systems)
184	0	1	0	Language selection (starting with program version 7): 0 = Language selection inactive (**OFF**) 1 = Language selection active (**ON**) Selection of the language (D, F, I) on boot of the EVM after system start, additionally (I) and (F) Product designation for input over service menu " 8 product designations".
186	0	1	0	Satam metering box: 0 = standard 1 = Satam
187	0	255	0	Satam threshold value (flow value)

Tab 5-24: Customer parameters: Operating parameter

5.2.2 Access Control through Driver and Master Codes

No.	min	max	default	Description
191	0	9999	0	Driver code (example: 1234)
193	0	9999	0	Master code (example: 4321)
199	0	2	0	Access to main menu option (periphery PC): through driver code / Master code setting like in customer parameter 200 to 203 (starting with program version 5)
200	0	2	0	Filling: 0 = free accessible 1 = Driver code and Master code 2 = Master code
201	0	2	0	Start / terminate trip: refer to parameter 200
202	0	2	0	Reports: refer to parameter 200
203	0	2	0	Service: refer to parameter 200

Tab 5-25: Customer parameters: Access Control through Driver and Master Codes

5.2.3 VAT

No.	min	max	default	Description
204	0	1000	200	VAT rate 0 (example: 20% enter 200)
206	0	1000	160	VAT rate 1 (example: 16% enter 160)
208	0	1000	75	VAT rate 2 (example: 7.5% enter 75)
210	000	222	111	Allocation for products 1 - 3: Hundred's place = filling product 1 Decimals place = filling product 2 Unit's place = filling product 3
211	000	222	111	Allocation for products 4 - 6: Hundred's place = filling product 4 Decimal place = filling product 5 Unit's place = filling product 6
212	000	222	111	Allocation for products 7 - 9: Hundred's place = filling product 7 Decimals place = filling product 8 Unit's place = filling product 9
213	000	222	111	Allocation for spec. products 20 – 34: Hundred's place = addit. products 20-24 Decimals place = addit. products 25-29 Unit's place = addit. products 30-34

Tab 5-26: Customer parameters: VAT

5.2.4 Communication over TDL Interface

No.	min	max	default	Description
220	0	31	0 _ _ _ _ _ _ _ _ 1 for Hectour	Transmission protocol for side A: - „point to point“ = 0 the addressing within a TWM is done by the Measurement side number - „multipoint“ = Bus address
221	0	31	0 _ _ _ _ _ _ _ _ 2 for Hectour	Transmission protocol for side B: - „point to point“ = 0 the addressing within a TWM is done by the Measurement side number - „multipoint“ = Bus address

Tab 5-27: Customer parameters: Communication over TDL interface

5.2.5 EURO Currency / Exchange Rate (Starting with Program Version 7)

No.	min	max	default	Description
243	0	3	0	Currency: 0 = Home currency as key currency 1 = Home currency as key currency EURO as secondary currency 2 = EURO as key currency 3 = EURO as key currency Home currency as secondary currency
244				Exchange rate: 8-digit exchange rate input

Tab 5-28: Customer parameters: EURO currency / course

5.3 Receipt Parameters / Printer Parameters

The printer parameters are used to define the data for the receipt printing.

Additional information to the description of receipts is found in *chapter 3.3 "receipt parameter and receipt format" page 3-4.*

No.	min	max	Def.	Description	Receipt range
1	0	2	0	Header: 0 = no header (default) 1 = Header “Delivery note” 2 = Header “Invoice”	Receipt type (paragraph 2)
2	0	1	0	Invoice number (refer to customer parameter 180): 0 = not printed 1 = printed	
3	0	1	0	Customer number: 0 = not printed 1 = printed	Customer data (paragraph 3)
4	0	1	0	Zero-printing: 0 = without Zero-printing: 1 = with Zero-printing:	
5	0	1	1	Start measuring (Time)	Allocation data (paragraph 4)
6	0	1	1	Terminate measuring (Time)	
7	0	1	0	Casting of the compensated sum total on the delivery receipt (corresponding to Measurement side)	French Transverse compression
8	0	1	0	Driver number	Vehicle data (paragraph 5)
9	0	1	0	Vehicle number	
10	0	1	1	Date casting activated = 1 Date casting inactivated = 2	
11	0	2	0	Delivery receipt with additive delivery: 0 = **without** additive text and mix ratio 1 = **with** additive text, without mix ratio 2 = **with** additive text and mix ratio	
12	0	1	0	Preset value	Measuring environment (paragraph 6)
13	0	1	0	Average temperature (always printed when calibration switch is activated)	
15	0	1	0	Amount	Invoice data (paragraph 8)
16	0	1	0	Basic price	
17	0	1	0	Net price	
18	0	1	0	VAT amount	
19	0	1	0	Measuring volume = VT (always printed when calibration switch is activated)	Filling data (paragraph 7)
21	0	1	0	Dashed line after customer/allocation data	
22	0	1	0	Dashed line after vehicle data	
23	0	1	1	Dashed line before filling data	

No.	min	max	Def.	Description	Receipt range
24	0	1	0	Dashed line before invoice data	
25	0	99	0	Blank line(s) after info line / receipt type	
26	0	2	1	Paper eject after printing is completed: 0 = Printer stops at last printing position 1 = Pull back paper (feeding position) 2 = Move paper forward	
27	0	99	0	Blank line(s) at beginning of receipt	
28	0	99	0	Blank line(s) after customer data	
29	0	99	0	Blank line(s) before filling data	
30	0	99	0	Blank line(s) before invoice data	
31	0	99	0	Blank line(s) before additional products	
32	0	99	0	Blank line(s) after additional products	
33	0	99	0	Receipt printing with adjustment to the left paper end (only by LQ 570+): 0 = Receipt printing left justified 1 – 99 = Number of blanks, that the re ceipt is shifted to the right.	
34	0	1	0	Additional line for any indication. The printout is on the bottom of the receipt. The content is defined over parameter 4 (max. 28 signs). 0 = non-activated 1= activated	

Tab 5-29: Customer parameters: Parameter Lists Customer Parameters

6. Sales of Additional Products (Additives)

6.1. Outline (Starting with Program Version 6)

The system allows to store up to 15 freely definable additional products.

Starting with program version 6 two types of additional products are distinguished:

- as extra product (handed out separately) to be selected at the end of the regular delivery and printed separately.
- as mixture to the original product during delivery with an additive pump in a pre-defined mixing ratio. In addition to the delivery quantity the additive name and mixing ratio are printed on the receipt.

6.2. Additional Products (extras, handed out separately)

6.2.1. Creation of Additional Products in the EVM (extras)

1. Select option “7: Additional products“ in the menu “4: Service”.

   The following menu is displayed:

   Additional products
   1: view / modify
   2: load into module
   3: load into TWM

2. Select “1: Additional products“ to display the parameters.

   The following display appears:

   Additional products view / modify
   1: Additional products
   2: Unit name
   3: Additive pump

   The system suggests a measurement unit when an additional product is modified or added.

   Should the suggestion not be appropriate, the name may be changed.

Determine measurement unit

3. Select “2: Unit name“ to display the unit-name.

   The following display appears

   Unit name (Additional product)
   Unit no.: 2 (Unit number 1 to 5)
   Name: Litre (Unit name max. 8)

The system suggests pre-defined unit names, whereby you can page through the units with the **# key**. The following units may be selected:

- 1 l (abbreviation for litres)
- 2 Liter
- 3 Stück (piece)
- 4 Stk. (abbreviation for piece)
- 5 kg (abbreviation for kilogram)

You may alter the pre-defined unit names (into your language). The maximum number of unit names is 5. When you rename a default name, the new name applies to all additional products with the same volume unit number.

Parameter view / modify

4. Enter the number "1" in the submenu " 7: Addition products "

   The following submenu appears on the display:

   Additional product view/ modify
   1: Additional product
   2: Unit name
   3: Additive pump

5. Select “1: Additional products“ to display the parameters.

   The following submenu appears on the display:

   20: P20 (Parameter number, product name)
   000,00 EUR / Litre **o. VAT.** (Cost per unit without VAT)

   Quantity input without comma (with / without comma)

   The cursor is located in line 1 on the parameter number. The parameters begin with parameter number 20. Up to 15 products may be stored.

Selection of the parameter number

6. Input the parameter number and acknowledge with the **Enter key** or select a parameter number with the **#** or *** keys**. Acknowledge your selection with the **Enter key**.

Input product names

7. Enter the product names (15-digits) and confirm when finished. Please consider:

   - the dots on the left and right hand side determine the entry field.
   - 4 characters have been assigned to each key (standard: 3 letters, 1 number). Please refer to the end of this description for the key allocation and the characters.
   - when pressing the key once, the 1st character is displayed. Each keystroke calls up the next character. After the fourth keystroke the 1st character appears again.
   - for capital letters press the **Clear key** after having selected a character.
   - Press the **Print key** after selection of the character a, o, or u to select special characters, as e.g. ä, ö or ü.

- for further special characters as for example ***** or **#** press the **0 key**.
- blanks: Press the **# key** without selecting a character.
- to delete characters move the cursor to the desired character (*** key** backward, **# key** forward) and press the **0 key** once.
- after having selected the correct character, switch to the next position using the **# key**.

Enter basic price

8. In the second line, enter a basic price for a quantity unit for an additional product, without VAT and with a total of five digits including two decimal places. A comma will be automatically placed between the 3rd and 4th digit. Confirm your input with the **Enter key**.

Determine unit

9. In the third line, enter the volume unit used to sell the additional product. You will be offered default measuring units. Scroll through them with the **# key**. You can select the units by typing the number and pressing the **Enter key**.

Define volume input

10. In the fourth line, you specify whether or not volumes are entered with decimal places. The **# key** toggles between the two options.

11. Confirm your choice with the **Enter key**.

These steps complete the definition of the first additional product. You can now proceed to define other products, or finish by pressing the **Cancel-key**.

Characters and Key Allocation for entering Additional Products

Key	How often	+ print key	+ clear key
Key 1	1 x = a 2 x = b 3 x = c 4 x = 1	ä	A B C
Key 2	1 x = d 2 x = e 3 x = f 4 x = 2		D E F
Key 3	1 x = g 2 x = h 3 x = i 4 x = 3		G H I
Key 4	1 x = j 2 x = k 3 x = l 4 x = 4		J K L
Key 5	1 x = m 2 x = n 3 x = o 4 x = 5	ö	M N O
Key 6	1 x = p 2 x = q 3 x = r 4 x = 6		P Q R
Key 7	1 x = s 2 x = t 3 x = u 4 x = 7	ü	S T U
Key 8	1 x = v 2 x = w 3 x = x 4 x = 8		V W X
Key 9	1 x = y 2 x = z 3 x = - 4 x = 9	.	Y Z
Key 0	1 x = blank 2 x = * 3 x = , 4 x = 0		

Characters and key allocation for entering Additional Products

Example: Entering a name for an additional product

Enter e.g. “Add 1“ as additional product name.

Entry	Display / Result
1 Correct #	a A Cursor moves to the next digit
2 #	d Cursor moves to the next digit
2 #	d Cursor moves to the next digit
#	blank Cursor moves to the next digit
1 1 1 1	a b c 1
Confirmation	Cursor moves to line 1: Entry has been stored

Tab 6-1: Example: Entering a name for an additional product

6.2.2 Selection of an Additional Product after End of Filling

Once the additional products are defined in the system up to 4 additional products may be entered after termination of the delivery and printed on the receipt.

The system status is “Filling completed“, “EF“ is displayed on the right-hand side.

1. Press the **Exit key**.

   The following menu is displayed:

   1: Continue filling
   2: New basic price
   3: Price
   4: Additional products

2. Enter “4: Additional products“.

   The product number of the last entered additional product (starting with 20) and the product name are displayed.

Select an additional product

3. Select the additional product required either by directly entering the product number or by paging to the required additional product name using the **# key.**

4. Confirm your selection.

   All data of the additional product selected are displayed:

20: Add 1	(Product no. and name)
060,00 EUR/l	(Price per unit; can be changed)
Volume: 000 l	(Product volume)
Amount w/o VAT. 00000,00	(Amount is automatically displayed after entry of volume)

Modify price per volume unit

5. In line 2 you may modify the price per volume unit if necessary and store the new price using the **Enter key**.

Enter sold volume

6. In line 3 enter the sold volume (without preceding zeros) and confirm.

   The amount without VAT is calculated on basis of the volume entered and the basic price and displayed automatically.

   The cursor is positioned in the first line again, the product has been stored.

Reset adoption of product

7. Use the **Clear key** and then the **Enter key** to reset the adoption of a product.

8. You can either select more additional products (max. 4) if needed or exit the menu using the **Exit key**.

Reset product selection

9. If you need to reset a product selection, set the cursor to the corresponding product number and press the **Clear key** and the **Enter key**.

   You can perform this correction for all selected products before printing. A selected product can be identified by the fact that values are defined in all 4 lines.

10. Display after end of filling can be left using the **Exit key**.

11. Using the **Print key** you can start printing the receipt with the selected additional products.

6.3. Additional Products (as a mixture by means of an additive pump)

6.3.1 Hardware for an Additive Pump

Starting with program version 6 the control for the additive pumps Sening and Blackmer are implemented in the TWM.

CAUTION!
Additive pumps of other manufacturers (e.g. Haar, Hyrolec etc.) may also be connected, if the interface is compatible to Sening / Blackmer.

To inject an additive the TWM 2084 controls:

- a single solenoid valve
  - this causes the pneumatic shift of the piston of a Sening pump or
  - controls the air motor of a Blackmer pump
  - Hyrolec similar to Sening
- a static input signal for Haar-pump.

For additional information on the hardware see chapter 1.2 " additive pump at EVM in AIII Filling system".

6.3.2 Allocation and Adjustment of Mixed Products

Each mixed product must be assigned to the EVM as new product with aunique name.

The product is defined using parameters 21 – 29 (as explained). Each product must be stored including reference density (calibration parameter 30-47), reference temperature (calibration parameters 51-59) and expansion constant K_0 - K_1 (calibration parameters 61-97).
The new product name is entered in the main menu "4: Service" under "8: Product name" with activated calibration switch (16 digits).

For detailed information to product name input see chapter 6.2.1 paragraph "product name input".

Enter basic price

The basic price of the mixed product must be entered. This is technically necessary, since the mixture takes place in front of the measuring chamber. Thus it is not possible to separate product and additive for the calibration needs.

CAUTION!

An official calibration acceptance is not necessary for mixed products.

6.3.3 Entry / Configuration of Mixed Products

1. Select “4: Service “position“ 7: Additional products“.

   The display shows the following menu:

   Additional products
   1: view / modify
   2: load into module
   3: load into TWM

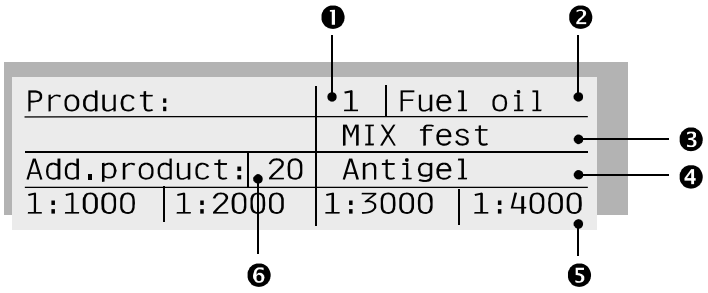
Parameter view / modify

2. Enter "1" using the numeric keyboard.

   The following submenu appears on the display:

   Additional products view /modify
   1: Additional products
   2: Unit name
   3: Additive pump

3. Select submenu “3: Additive pump“ in order to display the parameters of the mixed product. The following display appears:



❶	Input	product to be configured (setting 1-9)
❷	Display	Name of the product to be configured (field 1)
❸	Input	Type of mixture; 1 = **blocked** (product cannot be delivered) 2 = **unblended** (product is purely delivered) 3 = **mix fixed** (one of 4 mixing ratios in the field in line 4 can be selected before the delivery) 4 = **mix variable** (mixing ratio is determined before the delivery in ratio 1:500 - 1:4000)
❹*	Display	Name of the mixed product (additive; max 15 digits)
❺*	Input	4 x mixing ratio (if all ratios are equal (e.g. 1:2000) one ratio will be give as choice later on)
❻*	Input	number of addition product (setting 20-34)

** Input / display only if " mix fixed "/ " mix is variable " is defined.*

6.3.4 Delivery of Mixed Products

ATTENTION!
Installations with two EVM's separated from each other can only deliver mixed products via one filling point.

If the mixed products are defined as unique products in the system,
they may be delivered as usual *(see chapter 2.2 "product delivering").*

CAUTION!

With a mixed product (main product with additive) the basic price of the mixed product is entered.
If the TWM 2084 is configured as price calculator, the amount displayed with delivery refers to the mixed product.

Mixing ratio select / determine

If a product is selected, whose type of mixture "is mix fixed" or "mix variable", then the mixing ratio is displayed:

- „mix firmly" The **#** - **key** allows to toggle through the pre-defined mixing ratios (*if all ratios are identical one mixing ratio is displayed).*
- „variable mix" Mixing ratio may be selected in the range of 1:500 - 1:4000.

Activate pre-select value

The delivery of a mixed product should take place with pre-selection only. Thus, shortly before the end of a delivery, no more additive is injected to prevent that a rest of additive remains in the hose and / or measuring chamber and the following delivery might contain additive.

Change Additive

If the additive (mixed product) in the storage vessel of the additive pump is changed, then the configuration of the mixed products concerned in the EVM must again be entered.

CAUTION!
If no mixed product with the new additive is found in the product list to the delivery, then the new product should be entered via submenu "8 product name".

- Select „4: Service“ (main menu)➔ „7: Additional products“ ➔ „1: view / modify the function” „3: Additive pump“ and “acknowledge”.

  Afterwards set type of mixture as follows:

  - with old mixed products on " closed "
  - with new mixed products on " mix fixed " / " mix variable"

Failure reports

On system start as well as during delivery the TWM 2084 executes a check of the additive pump operation.
If malfunctions occur with this check, then these will be shown in form of an "error code" on the display of the TWM. In this case delivery is not started or interrupted.
Detailed information on error messages of the additive pump is found in chapter 11 "system messages", paragraph 11.2.3 "Sening additive pump” and 11.2.4 "additive pump Blackmer".

CAUTION!
If the TWM displays "cycle time of the additive pump exceeded" (error code 53) and this is not due to the hardware ("air in the system", "additive storage vessels empty" or "defective additive pump"), then you may try to increase the max. cycle time (calibration parameter 237).

6.4. Data Backup with Parameter Modules

The stored mixed products’ names and parameters (price, quantity unit, reference density and type of mixture) can be stored in a parameter module. Stored data can of course be loaded again from the parameter module into the TWM.

CAUTION!

The data of the mixed products (parameters) cannot be stored together with the data of the receipt, customer and calibration parameters on one module.

For storing the data starting with program version 7 or higher use these three modules:

- 1; Data for receipt, customer and calibration parameters
- 2; mixed product names
- 3; additional product parameters

These modules may be purchased (part no. 2084.90 01 01 00).

Store parameters

1. Put the EPROM module into the TWM (see e.g. position 1, fig. 12-2).
2. Select "4: Service " in the main menu.
3. In the service menu select "7: Additional products "
4. Select the function "2: load into module".

   The submenu appears on the display:

   Load additional products into the module?
   Confirm: yes
   Cancel: no

5. Press the **Enter key**.

   If the transfer is successful, the system announces "function executed" and returns to the "mixed products" service menu.

Load parameters

1. When reading or storing data into the TWM select menu "4: Service" in the main menu.
2. In the service menu select "7: Addition products"
3. Select function "3:load parameters into TWM".

   The submenu appears on the display:

   Load parameters into the TWM?
   Confirm: yes
   Cancel: no

4. Press the **Enter key.**

   If the transfer is successful, the system announces "function executed" and returns to the "mixed products" service menu.

6.5. Printout of the Additive Quantities in the Trip Report

If, during a trip, deliveries with mixed products occur, the trip report is printed as follows.

```
 Trip report
Report no.                          1
Receipt date      02.09.2003  15:11
Counter no.          A        000001
Counter no.          B        000002
Vehicle no.                AG 123456
Strt.of trip    28.08.2003    10:30
End of trip     02.09.2003    15:08
Total                    000074045 L

 No. Time  Cu-no  Prd.     Vo   Amount
    Dura. Syst. grd.C     Vt   EUR/100L
-----------------------------------------
  1 10:30          1    3450
       1    1   -1,2    3404
                         ❶----
  2 10:36          1   29831
       6    1   +5,8   29603
                         ----
  3 10:45          1     877
       1    1   -1,2     865
                         ❷----
  4 10:46          1   38220
    1307    1   -1,2   37711
                         ----
  5 14:56          1    1453
       0    1   +0,3    1435
            1   +0,3       2    21,10
  6 15:06    1234  2     214    96,51
       0    1   +0,3     211    45,10
                         ----
-----------------------------------------
Product  1        +0,5   73831
     1315                73018
Product  2        +0,3     214    96,51
       0    ❸          ❹ 211    45,10
Total            +0,5   74045    96,51
     1315                73229
Additiv          +0,3       2    21,10
```

The amount of additive in a delivery is printed in the 3rd line, 5th row ❶ (3 pre- and 2 post-decimal positions). If a product without additive is delivered❷ the following characters „- - - -“ are printed.

Following the product-related totals for each delivered additive a line is inserted, the additive name❸ in the first row and the sum total ❹ of the additive for the appropriate trip in the 5th row.

7. Euro

7.1. Convention/ Configuration of Euro

The conversion / configuration of the home currency to the Euro is done using customer parameters 243 / 244. These parameters are available starting from program version 7 (2084.75.100.07).

CAUTION!

The calibration switch is not necessary for the conversion / configuration.

ATTENTION!
Before the conversion between home currency and Euro can take place the trip must be terminated and the trip report must be printed in order to balance the old trip.

7.2. Parameters of the Euro

For the Euro two new customer parameters have been pre-defined:

- 243; **Euro (currency)** with the following values:
  - 0 = Home currency as key currency
  - 1 = Home currency as key currency, Euro as secondary currency
  - 2 = EURO as key currency
  - 3 = EURO as key currency, home currency as secondary currency

- 244; Euro (exchange rate) in form of an 8-digit text string. The input takes place in the usual way, e.g. during the input of the product names. The comma position may be set as desired. For example:
  - England Pound = 0,6987
  - Germany EUR = 1,95583

7.3. Display and Print Format

Display

After the conversion to Euro as key currency, the TWM uses the EURO-sign on the display and on the printout the abbreviation "EUR", at all places where the home currency was formerly used.

Voucher printing

Furthermore, uniform display formats apply instead of the national positioning of decimal point, multipliers and currency multiples:

Basic price:	XXX,XX	EUR/100 l
Amount:	XXXXXXX,XX	EUR

Additional lines on the voucher

If a secondary currency is configured in parameter 243, two additional lines are printed after the total amount, e.g.:

„1 EUR = 1,95583 DM“	(Exchange rate line)
„Total amount 54,40 EUR“	(Amount line of the secondary currency)

7.4. Retrofit / System Expansion for the Euro

Starting with program version 2084.75.100.07 the Euro functionality has been implemented. An update for older program versions is possible.

Dependent on the program version of the system, three different update options are offered.

ATTENTION!
After an intervention in the TWM 2084 the weights and measures office must be informed!

System expansion Option 1

Starting with program version 2084.75.100.04

Starting with program version 4 a new EPROM building block is needed. This replaces the exiting one.

Order number: 2084.90 30 00 00 (EPROM pre-calibrated)

System expansion Option 2

EVM AI up to program version 2084.75.100.03 or EVM AIII (new type) with module AI

For a TWM 2084 starting with system configuration

- EVM AI for all units up to program version 2084.75.100.03 or
- EVM AIII with computer module AI (*see Option 1)*

a new calculator module is needed:

- calculator module pre-calibrated Order no.: 2084.32.100.01

(Single calculator)

- calculator module pre-calibrated Order no.: 2084.32.200.02(Double calculator)

System expansion Option 3

EVM AIII (old type) with program version 2084.75.000.xx

Starting with EVM AIII with green connectors and program version 2084.75.000.xx the following is needed:

- EVM AIII pre-calibrated Order no.: 2084.01 00 00 01
- Country module („German“) Order no.: 2084.90 02 00 00

8. Truck-Data-Link Interface for TWM 2084 – PC Connection

8.1. Hardware

The TWM 2084 can communicate with an external PC using the Truck Data Link (TDL) interface.

In order to ensure a correct data exchange a modified hardware is necessary:

- Printer connection box with integrated demultiplexer
- TTY module with integrated multiplexer.

With these two units the TWM can be connected to a PC or an external printer. The PC for its part may control the printer or the TWM.

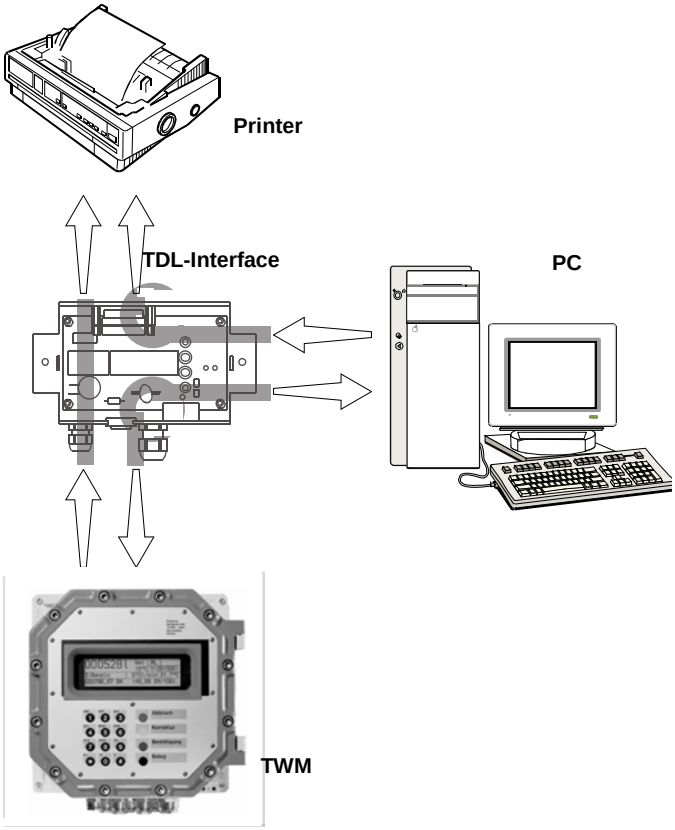


Abb. 8-1: Block diagram: TDL interface, TWM 2084, PC and external printer

Information on the connection cables and their plug allocation for the TDL interface is found in chapter 1 "connection diagrams TWM 2084", fig. *1-9: " connection diagram for printer connection box LQ-570+ with TDL interface ".*

8.2. Definition of the TDL Interface

The following interface definition refers to the connection TWM - PC only. The following transmission protocol of the TDL interface can be configured in two ways:

- „point to point“ for use with one TWM
- „multi-point“ for use with several TWM’s

Protocol	DIN 6634 8	Deviations from DIN
„point to point“	**66348 Part 1** - PC high Priority - TWM low Priority - code transparent - 8 bit, no parity - char. set PC 852	- DLE 3/12 not implemented - no ETB blocking - block length max 256 characters.
„multi-point“ (Field bus)	**66348 Part 2** - PC Master (Control station) - TWM Slave (Subset) - 7 bit, even parity - char. set DIN 66003	- no ETB blocking - block length max 256 characters. - no group receipt high-speed call - no transverse traffic

ATTENTION!

The following conflicts with the " multi-point" protocol are possible:

- The TWM does not answer (shorter time out values). The TWM is sporadically blocked during the control of the graphics display / printer. After a time out limit value of 42 ms (with 4800 bps) has been reached the complete receipt - / transmit data records have to be repeated by the PC.
- Receipt - / transmit data records must be completely processed with a double measuring system, before the PC may access the other measurement side. Otherwise the data still pending of the TWM are ignored.

Interface hardware

The PC is connected using the D-Sub-plug (9-pins) on the Com Port "V24/V28 " of the TDL interface.

Line	Signal	I/O Meaning
TXD		in (Data record)
RXD		out (Data record)
RTS	-12 V	switches to PC-TWM
	+12 V	switches to PC-printer
DSR	-12 V	TWM printer connection active
	+12 V	TWM-PC connection active

8.3. PC Operation

For the operation of the TWM with a PC there are 3 possible configurations. The selection is made in the main menu " 5: Service 2 " in submenu " 1: PC delivery ".

Value	Type of procedure	Remark
0	„Hand- Delivery“	no delivery over PC
1	„PC- Delivery“	PC- Delivery with „point to point“-Protocol
2	„PC- Delivery incl. Terminal mode“	PC- Delivery with “multi-point“- Protocol

8.4. Explanation concerning Customer and Calibration parameters

Customer parameters

Customer parameter 158

Customer parameter 158 must be set explicitly to 0. Only in this setting the PC can also communicate with the TWM in "hand delivery". At the same time it is also guaranteed that with "PC delivery inclusive terminal mode" a TWM in "hand delivery” does not disturb communication at the field bus with several users. The paper chute for the printer must be controlled by the PC.

Customer parameter 159

If the TWM is to react without delay to the PC connections (to avoid time out errors), then customer parameter 159 must be set explicitly to 0.

Otherwise the TWM may turn off (automatic turn off function). The booting of the TWM takes approx. 5 seconds. Afterwards the initialisation with the TDL program version between PC and TWM must take place, before actual data communication can start.

Customer parameter 199

Access to submenu "5: Service 2" can be protected like all other functions of the main menu with a driver - / master code (*see chapter 5.2.2 " access control with driver and master code ", customer parameters 199 and 200).*

Customer parameter 220 and 221

For the communication PC - TWM two transmission protocols can be selected.

Protocol	Connecting type	Customer parameter
DIN 66348 Part 1	„point to point“	Customer parameter 220 = 0 (disabled side A) Customer parameter 221 = 0 (disabled side B) The addressing within the TWM is made by the measuring point number (side A or B).
DIN 66348 Part 2	„multi-point“ (Field bus)	Customer parameter 220 = Bus-Address for TWM side A Customer parameter 221 = Bus-Address for TWM side B

Calibration parameter 99

Calibration parameter 99 determines whether the calibration data for the receipt are transmitted completely by the TWM. Otherwise the PC transmits the non-calibration data itself to the printer and gives the command to the TWM to send the calibration data only.
The parameter can take the following values:

- 0 = no voucher printing
- 1 = Receipt printing completely done by the TWM wing slip printer TM 295
- 2 = Receipt printing done by the PC on an external A4-printer with the insertion of the required calibration data by the TWM.
- 3 = Receipt printing completely done by the TWM on external A4-Printer.

CAUTION!

If "PC delivery inclusive terminal mode" is configured on the TWM, then the PC can generate the customer relevant data for the receipt and send it to the printer. The rest of the data is sent by the TWM.

For diagnostic reasons a specific mask allows to get background information on the PC-link.

CAUTION!

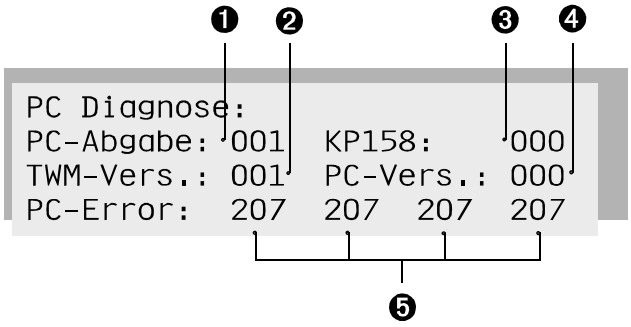
The diagnosis is only possible if:

- PC delivery is active (i.e. "1: PC delivery" = 1 / 2).
- the paper snatching function for the printer is inactive (customer parameter 158 = 0)

Call PC diagnosis function

5. Enter "5" in the main menu for submenu "5: Service 2".
6. Select "2: Diagnose", in order to call the diagnostic function.

   On the display the following mask appears:



❶* Display PC operation
1 = PC-Delivery or
2 = PC- Delivery inclusive terminal mode

❷* Display TDL- Program version of the TWM
0 = for PC-Delivery*
1 = for PC delivery inclusive terminal mode *

❸* Display Paper snachting for the printer (customer pa rameter 158)
0 = Snatching function inactively

❹** Display TDL-program version of the PC = 0

❺ Display shows 4 x error code of the TWM-PC communication. The first field shows the last error code (meaning see next page)

** mandatory specifications at the TWM for PC delivery (dependent on the type of procedure of the PC operation)*
*** mandatory specification at the PC for the PC delivery*

Meaning of the error codes

Value	Meaning
0	no error
0xx	Error on delivery, xx = Delivery-Error-Code of the TWM
1xx	Data record error, xx = Field number in the data record
200	Delivery preparation is not permit at the moment
201	TWM - program version not well-known or in-compatible to the program version of the PC
202	Delivery data recall or print not permitted
203	No delivery data record available or CRC error
204	Error with the printing of the delivery data (printers has no more paper or printer busy)
206	Display control not permitted, if the TWM is not in the type of procedure " PC delivery inclusive ter-minal mode "
207	No transfer between TWM and PC (only for the diagnostic mask) since last system start

9. Bypass-Control

9.1. Function of the Bypass Control

If the flow of the medium is stopped while the pump is running, a large increase of pressure in hydraulics and noise level of the pump is recognised.

In order to reduce this increase of pressure as well as the increased noise level, the TWM is capable of controlling a bypass-valve underneath a defined flow rate. Additionally the bypass control can be used for to control a valve for the flow delimitation to 200 l/min (limit given by German law).

9.2. Configuration of the Bypass Control

Calibration parameters 106 and 107 are responsible for the configuration of the bypass control.

Calibration parameter 106: Bypass operating mode

With this parameter the operating mode of the bypass control can be determined:

0 = Bypass inactive (no bypass control)

1 = Bypass active, if flow rate is lower than pre-defined threshold value

2 = Bypass active, if flow rate is higher or equal the pre-defined threshold value

Calibration parameter 107: Bypass threshold

The input value determines the bypass threshold.

- 2 - 100 = bypass threshold in10 l/min (max. 1000 l/min.).

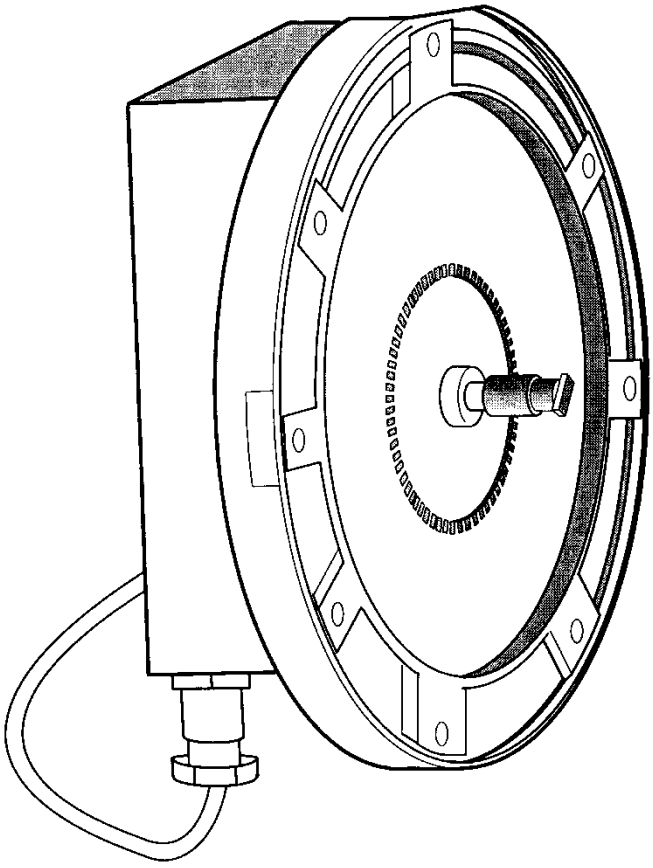
9.3. Connection of the Bypass Control

To activate bypass control the bypass-valve is connected to the valve outlet with the designation "final turn off valve" (red plug pins 4 and 8).

For the end delivery control, the outlet "general release" is used as usual (red plug pins 1 and 5).

10. Pulse Generator / Measuring systems

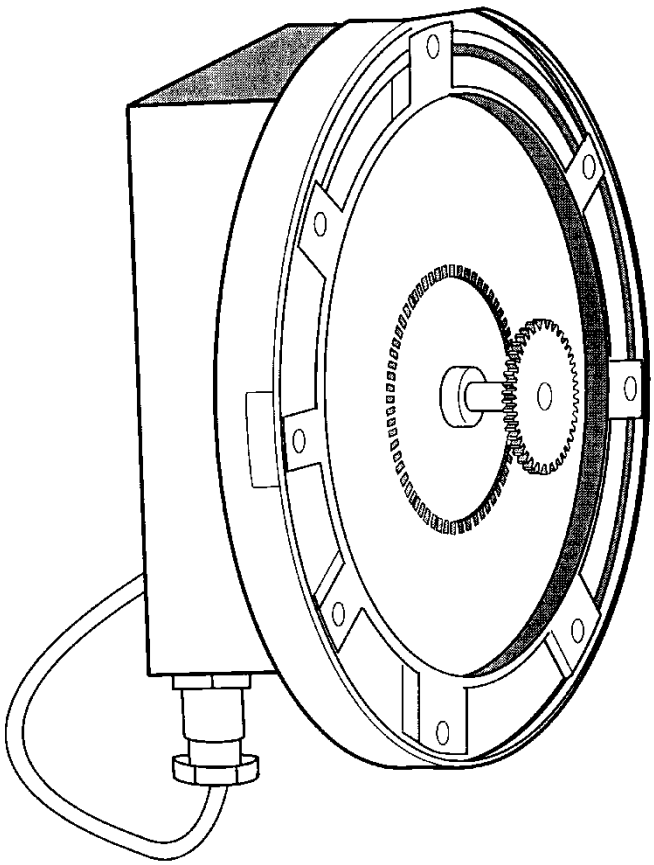
10.1. Liquid Control



Illustr. 10-1: Pulse generator Liquid Control for mineral oil delivery

Manufacturer / drive	Order number	Measuring chamber type / NW	Remarks
Liquid Control Drive from the rear	2084.40040100		Pulse generator with baseplate and drive clutch (clutch 2085.0120.076.001)

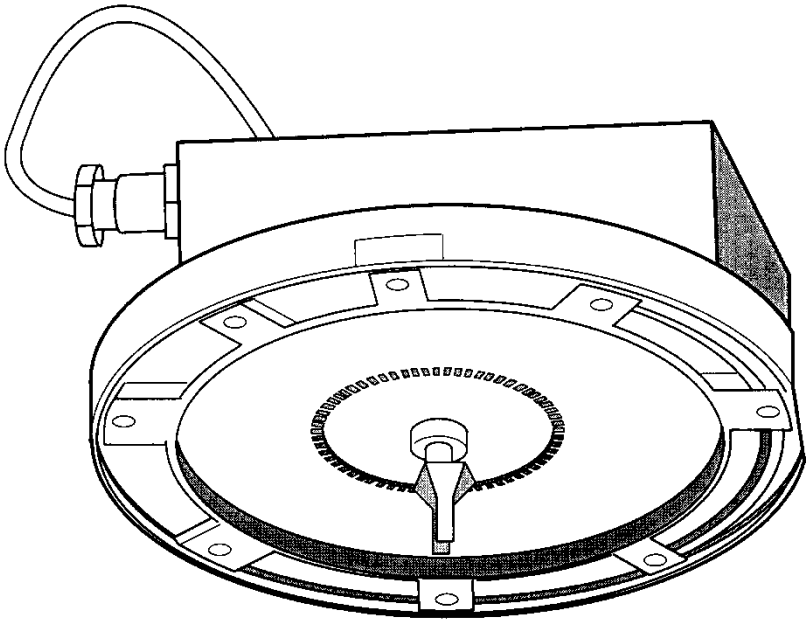
10.2. Satam



Manufacturer/ drive	Order number	Measuring chamber type / NW	Remarks
Satam Drive from the rear	2084.40030100		Pulse generator with baseplate and drive wheel (drive wheel 28 teeth 2085.0122.066.000)

10.3. Smith/ Sening

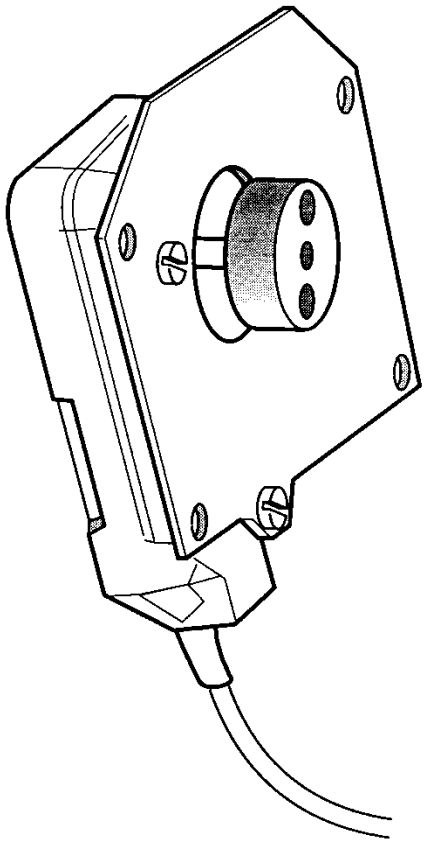
10.3.1 Pulse Generators for Retrofitting with Drive from the Bottom



Illustr. 10-2: Pulse generator Smith/ Sening for retrofit with Drive from the bottom

Manufacturer/ drive	Order Number	Measuring chamber type / NW	Remarks
Smith Meter/ Sening Drive from the bottom	2084.40020100	Z 1000 with elbow piece Z 700 Z 400	Pulse generator with baseplate and drive clutch (Fork clutch 2085.0120.050.000)

10.3.2 Pulse Generators for Retrofitting with Direct Drive



Illustr. 10-3: pulse generator for retrofit with direct drive

Manufacturer/ drive	Order number	Measuring chamber type / NW	Remarks
Smith Meter/ Sening with direct drive	2084.40020200	GMVT 403 GMVT 703 GMVZ	The pulse generator is delivered without additional housing.

10.4. Coriolis Counters (Measuring System)

The TWM 2084 may be connected to the integrated mass flow measuring system ”promass 64” of Endress & Hauser.

10.4.1 Measurement Principle and Configuration

The mass flow measuring system " promass 64 " uses the controlled creation of Coriolis forces and transfers the pulses as standard mass impulses.

The "promass 64" must be configured in such a way that it transmits uncompensated litre impulses. Only so the TWM is capable of calculating, compensated and uncompensated quantities [litres], including the specific displays and printouts (at 15 °C...).

CAUTION!
Starting with program version 7, the TWM is capable of processing the max-output frequency (500 Hz) of the “promass 64”.

10.4.2 Hardware Type Ex “e”

Type

The “promass 64” is available in two types – one of them being Ex “e” with increased security.

Interface of the pulse generator

For the interface of the pulse generator 4 lines are necessary:

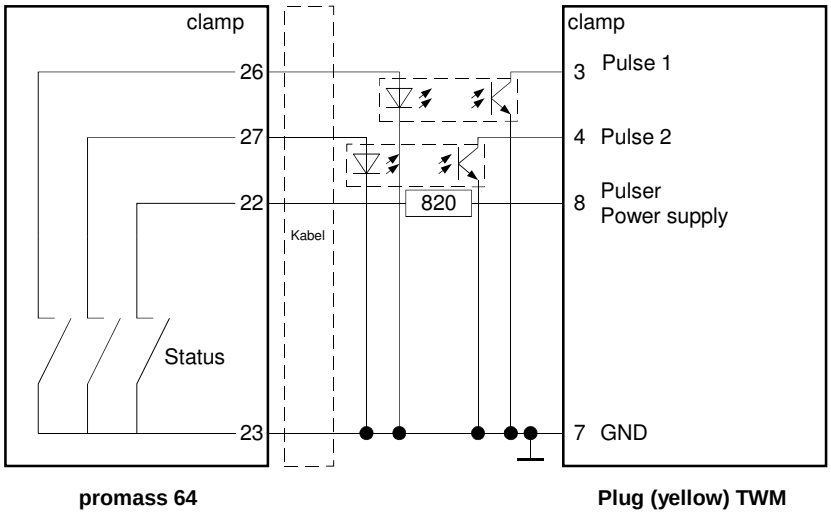
- Pulse 1
- Pulse 2 (90° phase shift to impulse 1)
- Status (Pulse generator power supply)
- common ground (GND)

Status relay

The pulse generator power supply of the TWM 2084 serves as status input, in order to detect errors of the measuring system.

The status relay of the measuring system is:

- closed; in case of error free operation thus a quiescent current flows according to that externally connected resistance
- open; in the event of an error thus the current check of the TWM 2084 announces a pulse generator current error



Illustr. 10-4: Connection diagram: “promass 64 " to TWM 2084

Power dissipation

In order to keep the power dissipation low, two external resistances of 1 kW are bridged vs. 12 V power supply into the yellow TWM plugs pin 3 and 4 (see picture).

Adjustment of the current check of TWM 2084

The promass 64 must be connected to common ground (passive interface). Pin 23 is grounded (see picture)

The current control of the TWM 2084 needs to be configured using the
calibration parameters:

- Parameter 108 = 1 (pull up resistor)
- Parameter 11 = 210 (60 mA)
- Parameter 12 = 251 (5 mA)

Calculated values of the calibration parameters see chapter 5.1.3 "pulse generators: Current cotnrol / advance suppression ".

10.5.1 Single Solenoid Valve – Controller – Function

How it works…

The existing single solenoid valve outputs in the TWM are configured deviating from the usual function, firmly assigned to the appropriate delivery way. For the additionally necessary valves the valve outputs of the double calculator configuration are used.

The double calculator function is not usable with the function described here.

With the function “integrated delivery control” the function of a conventional control switch (for delivery ways) is taken over by the TWM.

10.5.2 Activation of the Delivery Way

If the default valve is maintained at 0, the software controls all single solenoid valves according to the usual method, i.e. the control switches - function remains inactive.

With a value higher than 0 the control switch is activated and the appropriate delivery way is configured.

Full hose 1	1
Full hose 2	2
By pass 1	4
By pass 2	8
Empty hose 1	16
Not-measured 1	32
Not-measured 2	64

Example: if a TWM is to be configured with full hose 1, full hose 2, bypass 1 and not-measured 1, calibration parameter 130 is to be set to (1+2+4+32 =) **39**.

Call calibration parameter 130 and confirm (calibration switch activated). The display shows

CP 130:			1: Full	1	-
2:	Full	2 -	3: Bypass	1	-
4:	Bypass	2 -	5: Empty	1	-
6:	Not-mea	1 -	7: Not-mea	2	-

Now you can be specify, which kind of delivery is needed.

For example, if key 3 is pressed, then a “+” appears behind delivery bypass. This means that bypass 1 has been selected. Further delivery ways are selected likewise. Once all delivery ways are selected, CP 130 may be exited by confirmation.

10.5.3. Delivery Way and Product Allocation with CP: 131 – 139

Here the delivery ways enabled via calibration parameter 130 are assigned to the products 1 - 9 (CP 131 - 139). The calculation and allocation of the parameter values are effected exactly as described in CP 130.

Example: If in calibration parameter (CP) 132 a delivery way is selected, which is not activated in CP 130, then it will not be offered upon delivery.

Allocation of the valves to the delivery ways, Control at beginning of delivery

Delivery way	Valve exits	
Full hose 1	5 immediately	1 (after 5 seconds)
Full hose 2	6 immediately	1 (after 5 seconds)
By pass 1	5 immediately	3 (after 5 seconds)
By pass 2	6 immediately	3 (after 5 seconds)
Empty hose 1	2 immediately	
Not-measured 1	7 immediately	
Not-measured 2	8 immediately	

Exits 5 and 6 may only be altered when no pressure is present.

Therefore, exits 5 and 6 are activated immediately and the valves after 5 seconds only.

Exit 4 is continued to be used for the additive pump.

Selection of the delivery way when preparing delivery

If CP 130 > 0 a menu “select delivery” is shown after the interaction “ok”, where the delivery is usually started.

Corresponding to calibration parameters 130, 131 – 139 the possible delivery ways are given as option, e. g:

1: Full hose 1 2: Full hose 2
5: Empty hose 1

The TWM will only accept the numbers that correspond to the allowed delivery ways or the cancel-key.

If empty hose is selected, an additional query is shown to omit false entries.

Empty hose?

Confirmation: yes Cancel: no

10.5.4 Wireless-Overfill Prevention System LRC

The LRC-small unit is a wireless system built of a sending and a receiving device according to German regulations (TRbF 511). The system needs to be installed outside the explosion hazardous area and controls the corresponding magnetic valve to prevent overfilling.

The following states lead to a closing of the valve and thus the closing of the pneumatic installation.

- overfill sensor detects liquid
- removal of the sending device from the sensor
- interruption of the radio-communication
- other failures
- manual interruption of the delivery

10.5.5 Connection and Parameterisation of the LRC

The TWM starting with version 2084.75.100.06 may be enhanced with an LRC-kit (2084.20 02 00 00). The adaptation may be done through Hectronic only and requests a new calibration of the unit. Software version 12 or higher can use the functionality. In order to activate the LRC, calibration parameter 110 needs to be set to 003.

The LRC is connected to the white plug (plug for temperature sensor) on Pin 1 and 2 (see connection plan 1-1).

Pin 1 = 24V (plus)
Pin 2 = -24V (minus)

If there is no LRC connected or the 24 V can not be sensed, a delivery is not started or will be interrupted.

10.5.6 Extension of the LRC overfill prevention system with ANA function

A TWM with program release 2084.75.100.14 and hardware version
2084.72 054 03 can be upgraded with the extension kit n° 2084.20 02 00
and the IAS extension 2084.20 01 00 00. The extension can be only made by Hectronic and has to be followed by a recalibration. Starting from program version 2084.75.100.14 the deadman function button (ANA) can be activated.

To activate the deadman function, calibrating parameter 110 has to set to “003” and client parameter 170 to “1”.

When preparing a delivery, the display shwos “ANA active? No“. By pressing the correction button ANA is activated. The TWM communicates through an additional control line with the LRC (the On/Off switch on the LRC is no more needed).

During delivery, the user is remembered every 30 seconds to push the ON/OFF button on the remote control unit of the LRC. Each time this is done, another 30 seconds are activated to allow to continue delivery.

If the ON/OFF button is not activated within 10 seconds, the LRC acts like the status “probe immersed”. Delivery is interrupted immediately over the control line to the TWM, and the error message “Error 84” appears.

10.5.7 LRC Extension with remote control unit

Deliveries with a TWM and the LRC are also possible with a remote control unit of the LRC, this means delivery is started by the TWM (status “delivery ongoing”) and it can be stopped with the ON/OFF button on the remote control unit of the LRC. The TWM switches to the status “delivery finished”, but it registers that the probe was not immersed and for this a “continue delivery” is possible. After pushing again the ON/OFF button of the remote control unit of the LRC, the TWM reacts like having activated the menu point “continue delivery”, this means the valves open again and the pulse counting proceeds.
This operation can be repeated any time needed.

10.5.8 Bypassing the LRC

The operation mode (calibration parameter 110 = 3) has been extended to allow a bypassing of the overfill prevention system by calibration parameter 110 = 4. If an error is detected on the LRC during the internal system test before delivery and no limit alarm system is recognised, the display shows “(Radio AFS not ready) bypass LRC?”. Confirming, the delivery can be started. On the tour protocol this delivery will be marked with (LRC bypassed)“.

ATTENTION!

Bypassing the LRC System is not always legally allowed. Please check the **legal directives** of your country.

10.5.9 LRC-Small as a remote control unit

If there are no limit value indicators, a delivery can be done with “Bypassing”.

ATTENTION!

Bypassing the LRC System is not always legally allowed.
Please check the **legal directives** of your country.

10.5.10 PIN Allocation of the LRC to the TWM

Connection TWM	Connection LRC – Charger	
White plug		
1 (X111)	PIN 5 grey	24 V output
Solenoid valve		
2 (X112)	PIN 8 black	Ground –
Output solenoid valve		
3 (X113)	PIN 15 brown	Release valve behind control blocks (only with IAS)
Yellow plug		
5 (X125)	PIN 3 yellow	Activation button for ANA

11. System Messages

11.1. Monitoring Functions and Error Messages

11.1.1 Display Monitoring

Type of check	When	Error message Code or Text	Error effect
Display test, display contents are read into memory	always	**10**	Current delivery is interrupted

Tab 11-1: Monitoring functions: Display monitoring

11.1.2 Voltage Monitoring

Type of check	When	Error message Code or Text	Error effect
Low-voltage monitor	always		Current delivery is interrupted

Tab 11-2: Monitoring functions: Voltage monitor

11.2. Error Messages and Analysis

11.2.1. Temperature Sensor

Type of check	When	Error message Code or Text	Error effect
Test of temperature sensor and meter circuit (permanent)	On program start, before and during delivery	**15**	Delivery preparation or delivery possible, current delivery is not interrupted
Plausibility of the temperature levels: Within 4 s the temperature may change around max 10 °C. Temperature measurement takes place 10x per minimum delivery quantity.	Monitoring during the delivery	**16**	current delivery is interrupted

Tab 11-3: Error Messages: Temperature sensor

11.2.2. AFS 60 (Overfill Prevention System)

Type of check	When	Error message Code or Text	Error effect
Test before delivery or bridged delivery with plug in test socket.	before delivery	Different error messages and notes in plain text	Delivery is not possible (eventually bridged delivery possible)
Error sensor circuitry	during delivery	Error probe circuit	current delivery is interrupted
Sensor dived in	during delivery	Probe submersed	current delivery is interrupted
Bridged delivery	Before, during and after delivery	bridged delivery (only printing)	Only bridged delivery possible
Lower limit switch defectively or not pressed	before delivery	**20**	Delivery not possible
Upper limit switch defectively or not pressed	before delivery	**21**	Delivery not possible
Upper limit switch not released in time	during delivery	**24**	current delivery is interrupted
Upper limit switch not pressed in time	during delivery	**25**	current delivery is interrupted
EEPROM defect	on system start	**26**	Delivery not possible
Resistance A-C defect	before and during delivery	**28**	Delivery not possible or interrupted
Resistance B-C defect	before and during delivery	**29**	Delivery not possible or interrupted
Resistance A-C and B-C defect	before and during delivery	**30**	Delivery not possible or interrupted

Type of check	When	Error message Code or Text	Error effect
CAN-Bus error	before and during delivery	**40**	Delivery not possible
AFS-Module defect	before delivery	**41**	Delivery not possible
CAN-Bus error	Before and during delivery	**42**	Delivery not possible res. inter-rupted

Tab 11-4: Error Messages: AFS 60

11.2.3. Additive Pump “Sening”

Type of check	When	Error message Code or Text	Error effect
Test additive pump quiescent position	Before and during delivery	**50** Error additive pump not in quiescent position, storage vessel empty	Delivery not possible or interrupted
Test whether flow rate for additivation too large	During delivery	**52** Flow for Additive too largely	Delivery is interrupted
Test whether cycle time of the additive pump is exceeded	During delivery	**53** Cycle time of the additive pump exceeded (piston wedges)	Delivery is interrupted
Test whether exceeded maximum quantity of 200,000 l of the additive pump is exceeded	During delivery	**54** Max delivery quantity for Additive exceeded.	Delivery not possible or interrupted

Tab 11-5: Error message: Additive pump “Sening”

11.2.4 Additive Pump “Blackmer”

Type of check	When	Error message Code or Text	Error effect
Test additive pump quiescent position	before and during delivery	**50** Answering lines before additive not in quiescent position	Delivery not possible or interrupted
Test additive supply	before and during delivery	**51** Storage vessel empty	Delivery not possible or interrupted
Test whether flow rate for additivation too large	During delivery	**52** Flow for Additive too largely	Delivery interrupted
Test additive supply	before and during delivery	**53** Additive container empty, air or contamination in the system	Delivery not possible or interrupted
Test whether maximum quantity of 200,000 l of the additive pump is exceeded	During delivery	**54** Max delivery quantity for Additive exceeded.	Delivery not possible or interrupted

Tab 11-6: Error message: Additive pump “Blackmer”

11.2.5 Test Program memory

Type of check	When	Error message Code or Text	Error effect
Contents of the PROMs are checked after switching on	on program start	Error program memory	No further control functions are possible
Check of the total of the calibration parameters	on program start	Calibration parameter falsely	Delivery not possible
Check of the customer and voucher parameters	on program start	Customer and voucher parameters check	Device can behave differently than required
Test summing up counter	After delivery	60	Summing up counter is deleted, then current refuelling is added
Test of the delivery data (check total)	on beginning of voucher printing	66 Up to AIII version 8: in the voucher head starting from AIII version 9: no casting of the delivery data	Delivery data can be false
	Control menu last delivery data	66 Check total error to AIII status 8: in the voucher head starting from AIII status 9: no casting of the delivery data	Delivery data can be false
Test EEPROM	when storing calibration parameters	EEPROM defect	Delivery not possible
Test (CRC) of the parameters in the parameter module	while loading the parameters	CRC Error	Parameter module is not loaded
Test (CRC) of the parameter identifier field	while loading the parameters	CRC Module ID	Parameter module is not loaded

Tab 11-7: Error message: Test program memory

11.2.6 Printer

Type of check	When	Error message Code or Text	Error effect
Test printer interface	when printing	Printers switch on	Printout not possible
Test printer status	when printing	Printer not ready, switch on	Printout not possible
Test printer protocol	when printing	Transfer error	Printout not possible / disturbed
Test paper sensor	when printing	Please insert paper	Printout not possible / disturbed
	after printing	Printer not ready	Printout not possible / disturbed

Tab 11-8: Error message: Printer

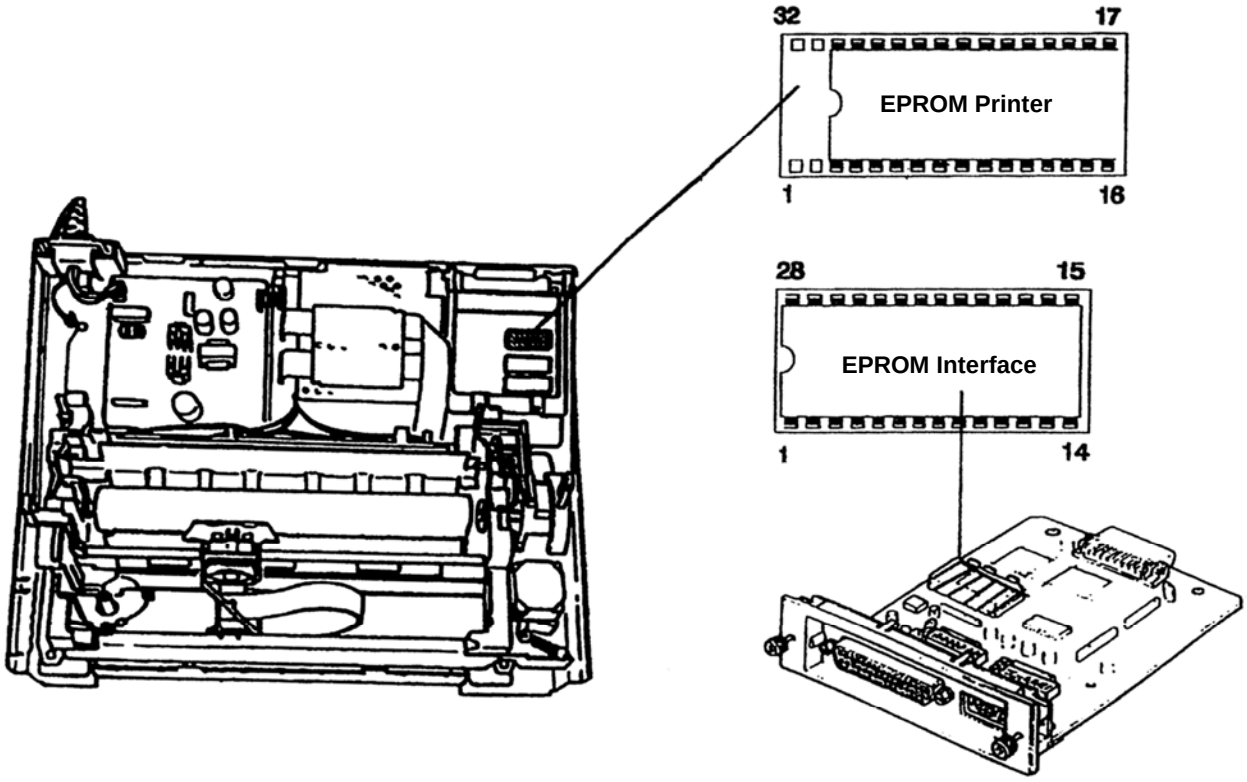
11.2.7 Pulse Generator and Single Solenoid Valve

Type of check	When	Error message Code or Text	Error effect
Test pulse generator current (permanent current): Observance of minimum and maximum current corresponds to calibration parameter 11 and 12	on program start	Error pulse generator	Delivery not possible
	Before and after delivery	**71**	current delivery interrupted
Overcurrent monitoring Single solenoid valves (AI)	During delivery	**75**	current delivery interrupted
Reverse impulses: occur only with the installation Calibration parameter 8 " direction of rotation " change.	During delivery	**80**	current delivery interrupted
Impulse channel monitoring: detects interrupted impulse channel (simulation during input 1/3/9 during a delivery)	During delivery	**81**	current delivery interrupted
Frequency monitoring: detects exceeding of the max incoming frequency or short circuit impulse channels.	During delivery	**83**	current delivery interrupted

Tab 11-9: Error message: Pulse generator and single solenoid valve

12. Sealing Plans TWM

12.1. Sealing- and DIP- Switch Plan for Printer LQ-570+ (DIN A4)

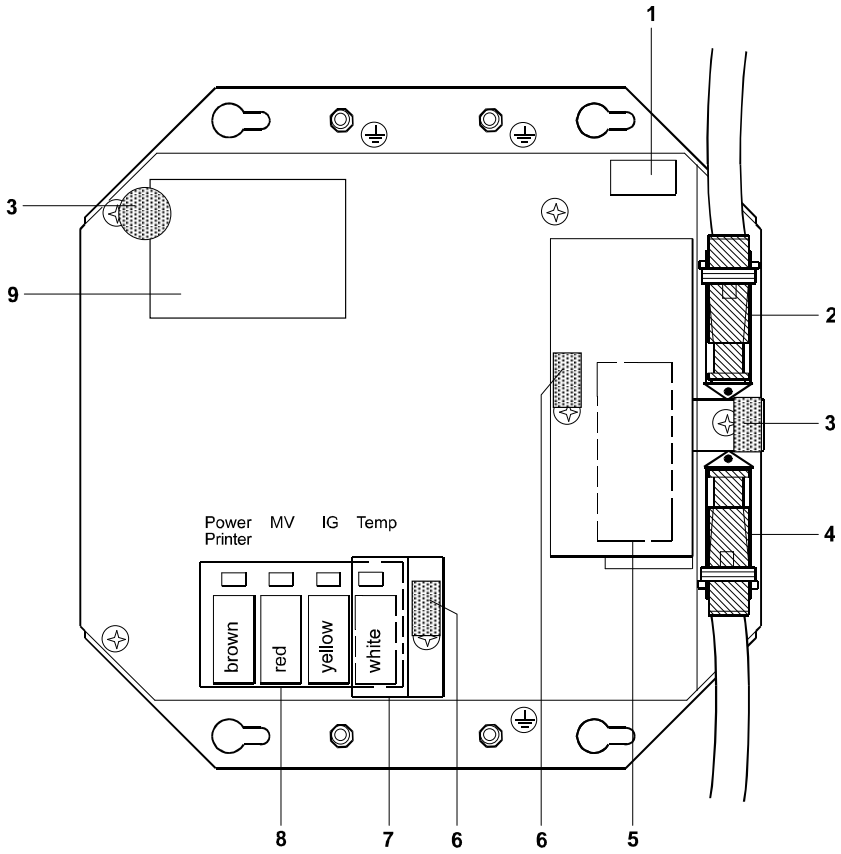


Illustr. 12-1: Sealing- and DIP- Switch plan for printer LQ-570+ (DIN A4)

ATTENTION!

After calibration the EPROMs shown above must be secured against replacement with calibration labels (seals).

12.2. Sealing Plan AI-EVM Single Calculator

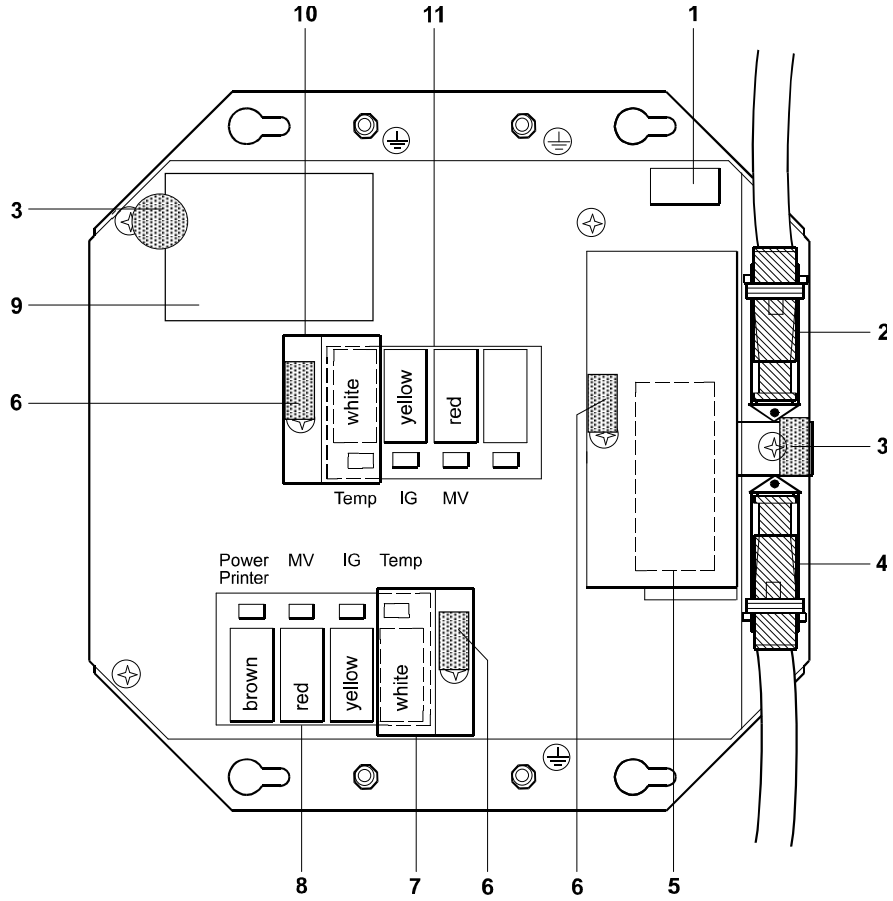


Illustr. 12-2: Sealing plan AI-EVM Single Calculator

ATTENTION!
After calibration covers 5 and 7 must be screwed on and sealed with calibration labels.

1 Plug connector parameter module
2 Plug connector display link
3 Stick-label (seal), mounted after pre-calibration.
4 Plug connector keyboard
5 Cover calibration switch and lithium battery
6 Stick label (seal) mounted after calibration
7 Cover plug connector temperature sensor Measurement side A
8 Plug connector for line adapters Measurement side A
9 Identification plate

12.3. Sealing Plan AI EVM Double Calculator

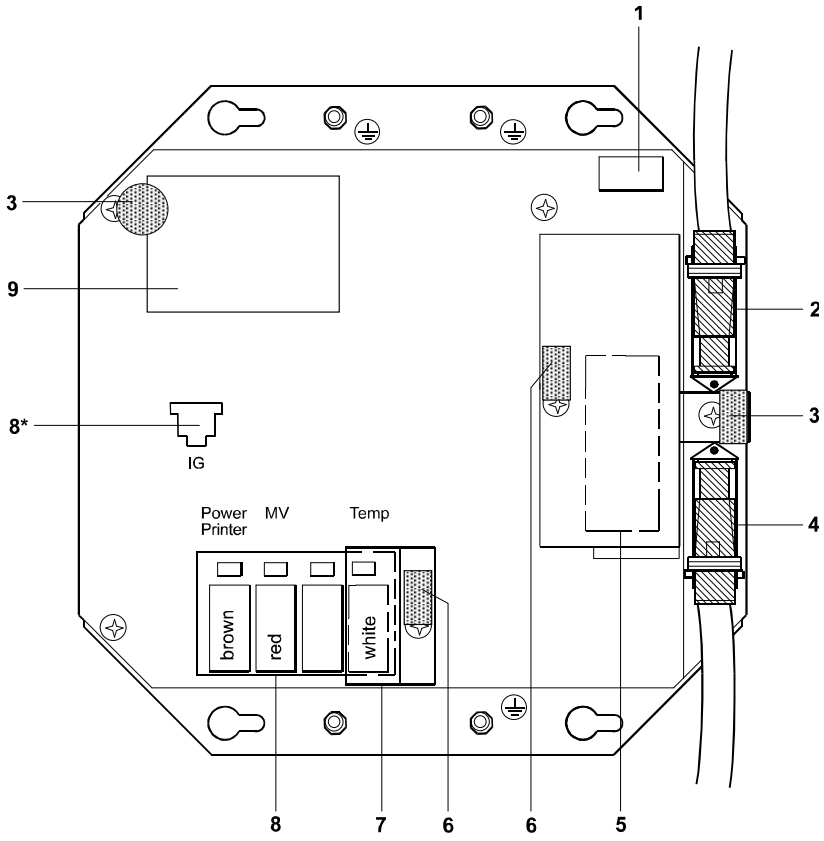


Illustr. 12-3: Sealing plan AI EVM Double Calculator

ATTENTION!
After the calibration covers 5, 7 and 10 must be screwed on and sealed with calibration labels.

1 Plug connector parameter module
2 Plug connector display link
3 Stick-label (seal) mounted after pre-calibration
4 Plug connector keyboard link
5 Cover calibration switch and lithium battery
6 Stick-label (seal) mounted after calibration
7 Cover plug connector temperature sensor Measurement side A
8 Plug connector for line adapters Measurement side A
9 Identification plate
10 Cover plug connector temperature sensor Measurement side B
11 Plug connector for line adapters Measurement side B

12.4 Sealing Plan for the AI-EMZ Calculator NAMUR or C7/14



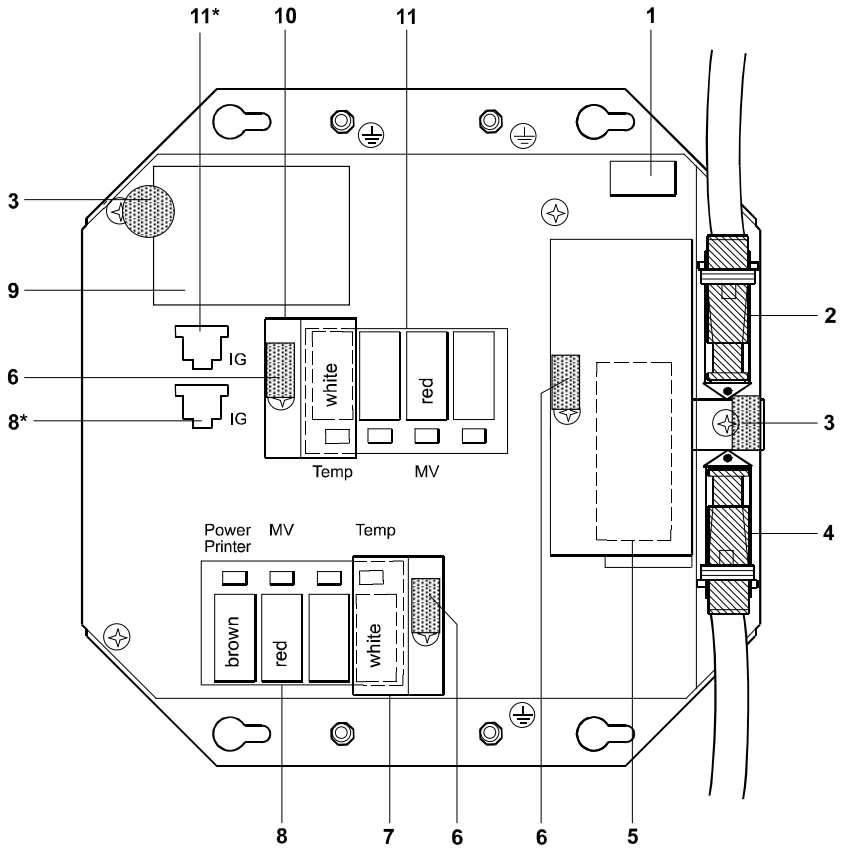
Illustr. 12-4: Sealing plan EMZ Calculator NAMUR or C7/14

ATTENTION!

After the calibration covers 5 and 7 must be screwed on and sealed with calibration labels.

1 Plug connector parameter module
2 Plug connector display link
3 Stick-label (seal), mounted after pre-calibration.
4 Plug connector keyboard link
5 Cover calibration switch and lithium battery
6 Stick label (seal) mounted after calibration
7 Cover plug connector temperature sensor Measurement side A
8 Plug connector for line adapters Measurement side A
8* Plug connector for Namur- or C7 / 14 Measurement side A
9 Identification plate

12.5 Sealing Plan for the AI-EMZ Double Calculator NAMUR or C7/14



Illustr 12-5: Sealing plan EMZ Double Calculator NAMUR or C7/14

ATTENTION!

After the calibration covers 5, 7 and 10 must be screwed on and sealed with calibration labels.

1 Plug connector parameter module

2 Plug connector display link

3 Stick-label (seal) mounted after pre-calibration

4 Plug connector keyboard link

5 Cover calibration switch and lithium battery

6 Stick-label (seal) mounted after calibration

7 Cover plug connector temperature sensor Measurement side A

8 Plug connector for line adapters Measurement side A

8* Plug connector for Namur or C7 /14 Measurement side A

9 Identification plate

10 Cover plug connector temperature sensor measurement side B

11 Plug connector for line adapters Measurement side B

11* Plug connector for Namur or C7 /14 Measurement side B

13. EC Declaration of Conformity, Certificats, Approvals

13.1. ATEX Approval

SEV Verband für Elektro-, Energie- und Informationstechnik

electrosuisse

(1) **EG-Baumusterprüfbescheinigung**

(2) Geräte und Schutzsysteme zur bestimmungsgemässen Verwendung in explosionsgefährdeten Bereichen - **Richtlinie 94/9/EG**

(3) Prüfbescheinigungsnummer: **SEV 12 ATEX 0102 X**

(4) Gerät: Elektronischer Mengenzähler Typ 2084.xx 01 xx xx

(5) Hersteller: Horn GmbH & Co. KG

(6) Anschrift: Munketoft 42, DE-24937 Flensburg

(7) Die Bauart dieses Gerätes sowie die verschiedenen zulässigen Ausführungen sind in der Anlage zu dieser Prüfbescheinigung festgelegt.

(8) Electrosuisse SEV, benannte Stelle Nr. 1258 nach Artikel 9 der Richtlinie des Rates der Europäischen Gemeinschaften vom 23. März 1994 (94/9/EG), bescheinigt die Erfüllung der grundlegenden Sicherheits- und Gesundheitsanforderungen für die Konzeption und den Bau von Geräten und Schutzsystemen zur bestimmungsgemässen Verwendung in explosionsgefährdeten Bereichen gemäss Anhang II der Richtlinien.
Die Ergebnisse der Prüfung sind im vertraulichen Prüfbericht 11-IK-0666.01 festgehalten.

(9) Die grundlegenden Sicherheits- und Gesundheitsanforderungen werden erfüllt durch Übereinstimmung mit:

EN 60079-0:09 **EN 60079-1:07** **EN 60079-11:07**

(10) Falls das Zeichen «X» hinter der Bescheinigungsnummer steht, wird auf besondere Bedingungen für die sichere Anwendung des Gerätes in der Anlage zu dieser Bescheinigung hingewiesen.

(11) Diese Baumusterprüfbescheinigung bezieht sich nur auf Konzeption und Bau des festgelegten Gerätes gemäss Richtlinie 94/9/EG. Weitere Anforderungen dieser Richtlinie gelten für die Herstellung und das Inverkehrbringen des Gerätes.

(12) Die Kennzeichnung des Gerätes muss die folgenden Angaben enthalten:

II 2G Ex d ib [ia Ga ib Gb] IIB T6 Gb

Electrosuisse
Benannte Stelle ATEX

Martin Plüss
Zertifizierung Produkte

SWISS CERTIFICATION

Fehraltorf, 15.02.2012

SEV 12 ATEX 0102 X / Seite 1 von 3

ZAM3d

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13.2. EC Declaration of Conformity

HORN TECALEMIT

Konformitätserklärung
Declaration of Conformity

Hiermit erklären wir, dass die Bauart
We herewith declare that the construction type

Typ: *Type:*	**TWM 2084 A1**
Bezeichnung: *Designation:*	**Elektronischer Mengenzähler** ***Electronic delivery meter***
Artikel-Nummer: *Item Number:*	**TW20841xx1xxxx**

in der von uns gelieferten Ausführung folgenden einschlägigen Bestimmungen entspricht:
in the form as delivered by us complies with the following applicable regulations:

- ATEX-Richtlinie 94/9/EG
  ATEX directive 94/9/EC

  EG-Baumusterprüfbescheinigungsnummer: **SEV 12 ATEX 0102 X**
  EC-certificate of conformity number:

  Benannte Stelle: Electrosuisse
  Notified body: Luppmenstrasse 1
  CH-8320 Fehraltorf

- EMV-Richtlinie 2004/104/EG
  Directive Electromagnetic compatibility 2004/104/EC
  Erfüllt die Grenzwerte gemäß 6.6, 6.7, 6.8 und 6.9 nach Anhang I dieser Richtlinie
  Fulfills the limits defined in 6.6, 6.7, 6.8 and 6.9 of Annex I according to this directive

- EMV-Richtlinie 2004/108/EC
  Directive Electromagnetic compatibility 2004/108/EC

Angewendete harmonisierte Normen/*Applied harmonised standards:*
EN 60079-0:2012 EN 60079-1:2008 EN 60079-11:2012
EN 55011:2007 EN 61000-6-1:2007

Angewendete normative Dokumente: / Applied normative specifications:
OIML R 117-1:2007(E)

EG-Dokumentationsbevollmächtigter: Jörg Mohr Horn GmbH & Co. KG
EC official agent for documentation: Munketoft 42
24937 Flensburg

05.02.2014 .....
Datum i.V. Dipl.-Ing. Jörg Mohr
Date Entwicklungsleiter / *Engineering Manager*

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SWIFT COBADEFFXXX
IBAN DE33215400600247600000
Amtsgericht Flensburg HRA 4264
USt-IdNr. DE813038919

HORN TECALEMIT

Konformitätserklärung
Declaration of Conformity

Hiermit erklären wir, dass die Bauart
We herewith declare that the construction type

Typ: *Type:*	**TWM 2084 A3**
Bezeichnung: *Designation:*	**Elektronischer Mengenzähler** ***Electronic delivery meter***
Artikel-Nummer: *Item Number:*	**TW20841xx0xxxx**

in der von uns gelieferten Ausführung folgenden einschlägigen Bestimmungen entspricht:
in the form as delivered by us complies with the following applicable regulations:

- EMV-Richtlinie 2004/104/EG
  Directive Electromagnetic compatibility 2004/104/EC
  Erfüllt die Grenzwerte gemäß 6.6, 6.7, 6.8 und 6.9 nach Anhang I dieser Richtlinie
  Fulfills the limits defined in 6.6, 6.7, 6.8 and 6.9 of Annex I according to this directive
- EMV-Richtlinie 2004/108/EC
  Directive Electromagnetic compatibility 2004/108/EC

Angewendete harmonisierte Normen/*Applied harmonised standards:*
EN 55011:2007 EN 61000-6-1:2007

Angewendete normative Dokumente: / Applied normative specifications:
OIML R 117-1:2007(E)

EG-Dokumentationsbevollmächtigter: Jörg Mohr Horn GmbH & Co. KG
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Datum i.V. Dipl.-Ing. Jörg Mohr
Date Entwicklungsleiter / *Engineering Manager*

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Amtsgericht Flensburg HRA 4264
USt-IdNr. DE813038919

13.3. Certificates

VDE Prüf- und Zertifizierungsinstitut

VDE

Prüfbericht KFZ-EMV

DAT-P-156/94-03
KBA-Register-Nummer: KBA-P00021-07

Prüflaboratorium:
VDE Prüf- und Zertifizierungsinstitut
Laboratorium für EMV-Messungen
Merianstraße 28
D-63069 Offenbach
Tel.: +49 (0) 69 8306-747
FAX: +49 (0) 69 8306-620
E-mail: Stephan.Kloska@vde.com

Angaben zum geprüften Gerät:

Auftraggeber:	Hectronic GmbH Tank- und Parksysteme; Allmendstraße 15, 79848 Bonndorf
Hersteller:	Hectronic GmbH Tank- und Parksysteme; Allmendstraße 15, 79848 Bonndorf
Aktenzeichen:	2098100-3650-0008/131820
Prüfling/Geräteart:	Elektronische Unterbaugruppe
Fabrikat/Typ:	Tankwagenmanagement-System TWM 2084 A3 dual
Eingangsdatum Prüfling:	2010-04-06

Ihr Ansprechpartner:	Herr Güldenpfennig	Durchwahl: (069) 8306-275

Angewandte Normen/Richtlinien entsprechend angewandtem KFZ-Bereich:

Deutsche Norm (DIN EN)	Europäische Normen/Richtlinien	IEC/CISPR-Norm
–	ECE-Regelung Nr. 10 einschließlich aller Änderungen bis Nr. 03 von 2008-08-14	–

Hinweise zu den Normen:	Grenzwerte gemäß Ziffer 6.5, 6.6, 6.8 und 6.9 dieser Direktive. Elektrische/Elektronische Unterbaugruppe (EUB), nicht sicherheitsrelevant. Prüfung Störeinstrahlung gemäß Ziffer 6.7 entfällt.
Gesamtergebnis:	**Bestanden**

VDE Prüf- und Zertifizierungsinstitut
Fachgebiet FG 43

Ausgabedatum:	2010-07-29	
Prüfer/Prüferin:	Frühsorge, Jochen	Frühsorge
Kontrolliert:	Güldenpfennig, Henry	

14. Decommissioning / Disassembly / Disposal

14.1. Decommissioning

It must be differentiated between temporary and definitive decommissioning

ATTENTION!

Temporary decommissioning implies:

- Switch off the system
- protect against switching on

14.2. Decommissioning with Disassembly and Disposal

ATTENTION!

Definitive decommissioning with disassembly implies:

- Only trained or instructed personnel (service technician) may carry out the decommissioning and the disassembly
- For electric installations must be removed by electrical specialists
- The disposal of poisonous / harmful to the environment substances must take place according to the current regulations and guidelines.

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