User manual

ITKU-83-02-02-21-EN

Mass converter

MW-04

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FEBRUARY 2021

PRECAUTIONS

Prior to installation, operation or maintenance activities, carefully read this user manual. Follow the instructions strictly.

	Prior to the first use, carefully read this user manual. Use the device only as intended.
	Protect the device against considerable temperature variation, solar and UV radiation, substances causing chemical reactions.
	The device must not be operated in hazardous areas endangered with explosion of gases, and in dusty environments.
	In the case of damage, immediately unplug the device from the mains.
	The device to be decommissioned must be decommissioned in accordance with valid legal regulations.
	If the module is to be operated in conditions that are difficult due to electrostatics (e.g. printing house, packing centre, etc.), you must connect it to the earth wire. To enable this, the device features functional earthing terminal, marked with ⏚ symbol.

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1. INTENDED USE

The MW-04 mass converter is designed to be a component of an industrial load cell scale. Depending on the needs, communication with the mass converter can be carried out via the following communication interfaces: RS232, RS485, Ethernet, Profibus, and Modbus protocol. The MW-04 mass converter can connect with PUE 5.15, PUE 5.19, indicators or a PC.

Operation of the MW-04 mass converter via PC is carried out using **MwManager** software. For more information on the MwManager software read MwManager manual.

2. WARRANTY CONDITIONS

A. RADWAG is obliged to repair or exchange all elements that appear to be faulty by production or by construction.
B. Defining defects of unclear origin and means of their elimination can only be realized with the assistance of the manufacturer and the user representatives.
C. RADWAG does not bear any responsibility for damage or losses resulting from unauthorized or inadequate performing of production or service processes.
D. The warranty does not cover:
   - mechanical damage caused by product exploitation other than intended, damage of thermal and chemical origin, damage caused by lightning, overvoltage in the power network or other random event,
   - inappropriate cleaning habits.
E. Loss of warranty takes place if:
   - a repair is carried out outside RADWAG authorized service point,
   - service claims intrusion into mechanical or electronic construction by unauthorized people,
   - the device does not bear security seal stickers.
F. Warranty conditions outline the warranty period for rechargeable batteries attached to the device for 12 months.
G. For detailed warranty conditions read the service card.
H. Contact with the central authorized service: +48 (48) 386 63 30.

3. MAINTENANCE

In order to clean the weighing instrument risk-free, it is necessary to disconnect the device from the mains.

Avoid using cleansers containing any corrosive chemicals, e.g. bleach (with chlorine). Do not use cleansers containing abrasive substances. Always remove the dirt using microfiber cloth to avoid damage of protective coating.

In the case of a daily maintenance:

1. Remove the dirt using cloth dipped in warm water.
2. For best results, add a little bit of dishwashing detergent.

4. SERVICE AND REPAIR

	***In the case of any sign of damage, it is necessary to disconnect the device form the mains immediately. The damaged component must be replaced or repaired by RADWAG service directly.***

In the case of any problems with correct operation of the device, contact the closest manufacturer's service point.

In the case of defects, deliver the faulty product to the manufacturer's service point. If the product cannot be delivered to the manufacturer's service point, call the service and report the defect. Repair scope and method will be set up.

	***The user is NOT ALLOWED to carry out any kind of repair of the device himself/herself. Any attempt of module modification, repair etc., by unauthorized persons, will result with loss of validity of manufacturer-issued certificates, declarations and warranty.***

5. RECYCLING

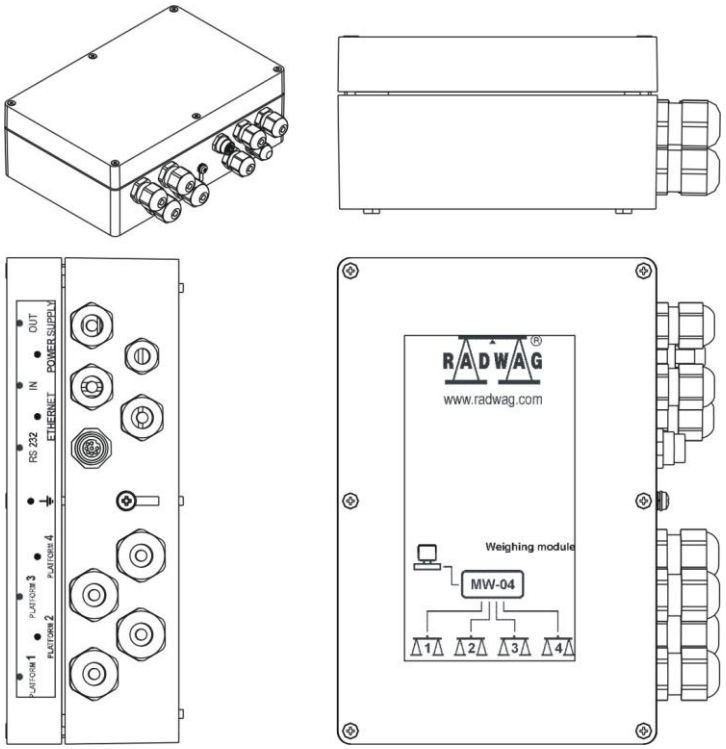
MW-04 mass converters must be recycled, they are not to be treated as a regular household waste. Devices to be decommissioned must be decommissioned in accordance with valid legal regulations.



6. MECHANICAL DESIGN

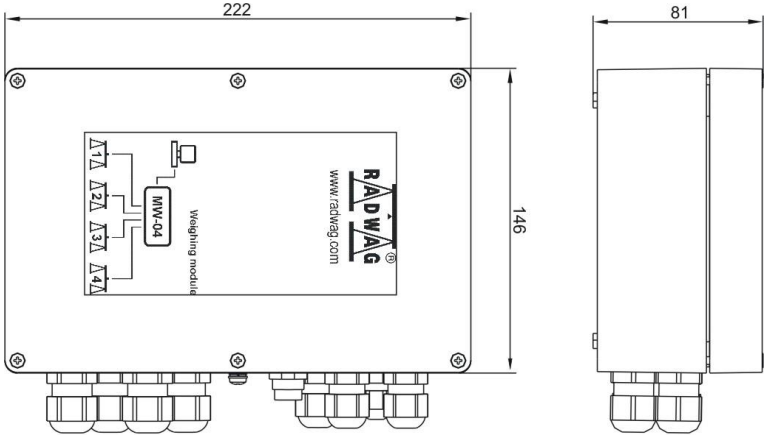
The MW-04 mass converter is equipped with metal housing. Signal cables are fed through cable glands. Communication with peripheral devices is carried out via one of the following communication interfaces: RS232, RS485, Ethernet, Profibus. MW-04 converter is equipped with 4 optoisolated inputs and 4 Opto MOS outputs. It is powered with 100÷-240 VDC voltage.

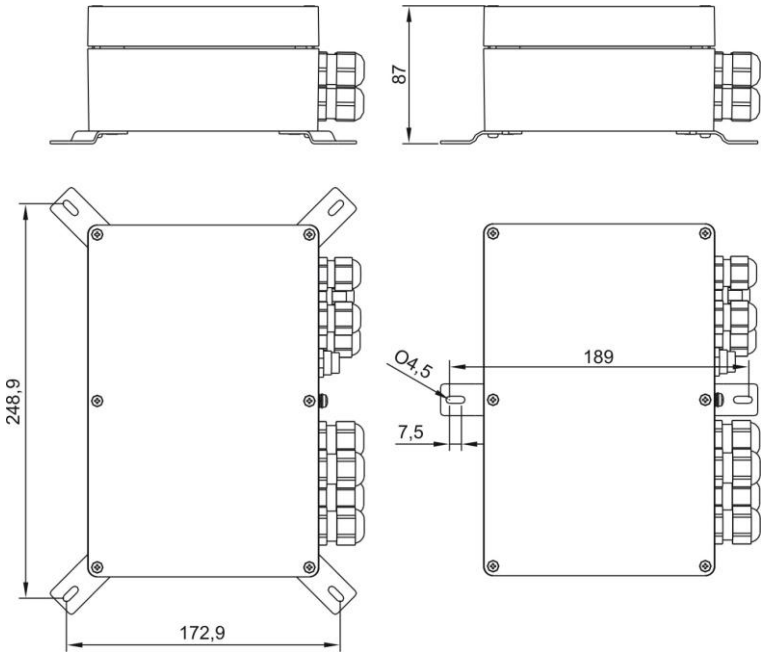
6.1. General View



MW-04 mass converter, general view

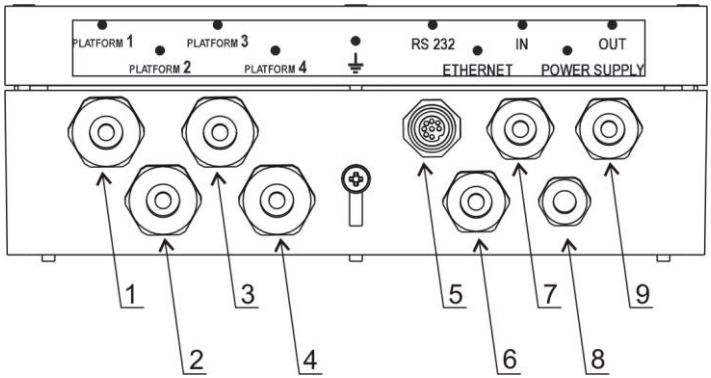
6.2. Dimensions





MW-04 mass converter, dimensions

6.3. Connectors



Arrangement of MW-04 mass converter's connectors

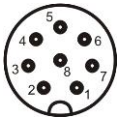
1	PG11 cable gland for platform 1.
2	PG11 cable gland for platform 2.
3	PG11 cable gland for platform 3.

4	PG11 cable gland for platform 4.
5	M12 8P connector for RS232.
6	M16 cable gland for Ethernet/RS485 cable (conditioned by the converter model).
7	M16 cable gland for 4IN cable (or PROFIBUS IN connector).
8	M12 cable gland for power cord 230VAC.
9	M16 cable gland for 4IN cable (or PROFIBUS OUT connector).

6.4. Pin Arrangement

	***Pin arrangement (signals) for 4IN/4OUT, RS485, PROFIBUS modules is to be found in section 10 of this manual.***

6.4.1. RS232 Pins

RS232		Pin2 – RxD Pin3 – TxD Pin5 – GND

6.5. Technical Specifications

MODEL	**MW-04-1**	**MW-04-2**	**MW-04-3**
Standard platform qty	2		
Maximum platform qty	4		
Communication interface	RS232, Ethernet	RS232, RS485	RS232 PROFIBUS
4IN/4OUT module*	1	1	-
RS485 module	-	1	-
PROFIBUS module*	-	-	1
DP-5 platform module	2	2	2
Housing	Aluminium		
Ingress protection	IP65		
Power supply	100 ÷ 240 VAC 50 ÷ 60 Hz		
Power consumption	25 W		
Operating temperature range	-10 °C ÷ 40 °C		
OIML class	III		

Verification units	6000
Maximum input signal gain	19.5 mV
Maximum converter division qty	8388608
Maximum voltage per verification unit	3.25 uV
Minimum voltage per verification unit	0.4 uV
Minimum load cell impedance	80
Maximum load cell impedance	1200
Load cell excitation voltage	5 V
Load cell connection	4 or 6 wires

***)** - *PROFIBUS and 4IN/4OUT modules are mounted interchangeably (the device is equipped with one of them only).*

7. INSTALLATION

7.1. Unpacking and Installation

A. Take the mass converter out of the packaging.
B. Connect the weighing platform to the mass converter, next place the weighing device on a flat and even surface. Keep it away from any sources of heat.
C. Level the device.

	***Levelling procedure is to be found in 'TWM4 Scale' user manual.***

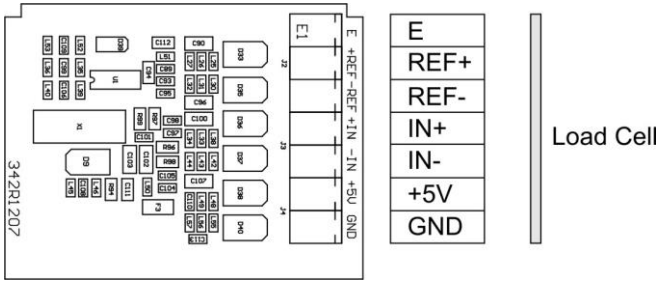
7.2. START-UP

- Plug the power cord to the mains.
- Wait for connection to be established between the mass converter and the **„MwManager”** software, read the weighing result.

	***The procedure of communication establishing and a detailed description of connection between the MW-04 mass converter and the 'MwManager' software is to be found in the 'MwManager' user manual.***

8. INSTALLER INSTRUCTION

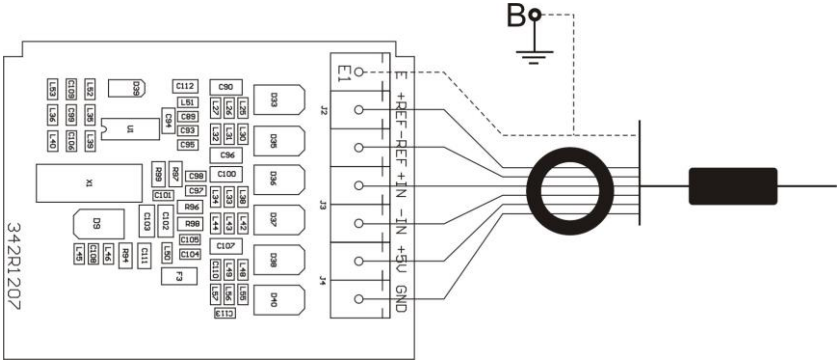
The MW-04 mass converter can be a base component of a load cell scale. Maximum quantity of installed A/D converters in MW-04 mass converter is 4 pcs. Parameters of all converters are identical.



A/D converter board

8.1. 6-Wire Load Cell Connection

Connect 6-wire load cell to the main board following the diagram below:

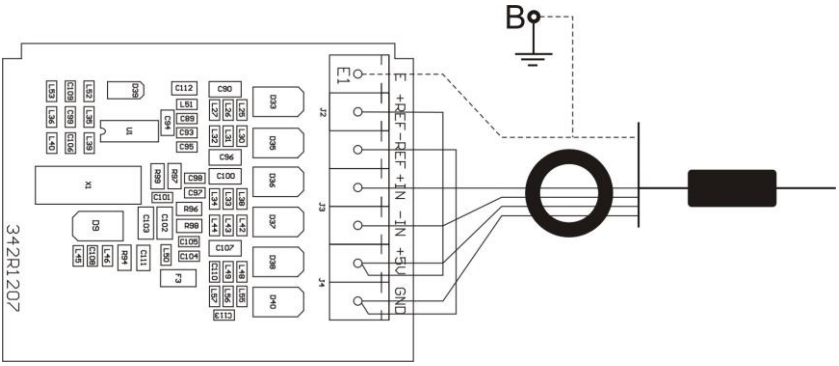


6-wire load cell connection

Connection	Load cell signal	REMARKS
E	SHIELD	Refer to section 8.3
REF+	SENSE +	JP1 not to be soldered
REF-	SENSE -	JP2 not to be soldered
IN+	OUTPUT+	
IN-	OUTPUT-	
+EXC	INPUT+	
-EXC	INPUT-	

8.2. 4-Wire Load Cell Connection

Connect 4-wire load cell to the main board following the diagram below:



4-wire load cell connection

Connection	Load cell signal	REMARKS
E	SHIELD	Refer to section 8.3
REF+	-	Connect to +5V
REF-	-	Connect to AGND
IN+	OUTPUT+	
IN-	OUTPUT-	
+EXC	INPUT+	
-EXC	INPUT-	

8.3. Connecting Load Cell's Cable Shield

	Scale with a mass converter in a metal housing connected with a platform via a load-cell signal cable.	Scale of compact mechanical design, mass converter in a metal housing connected with a platform via an extension arm, etc.
Platform w/o galvanic connection of the signal cable shield.	**POINT A, B**	**E**
Platform with galvanic connection of the signal cable shield.	**POINT A, B**	**POINT A, B**

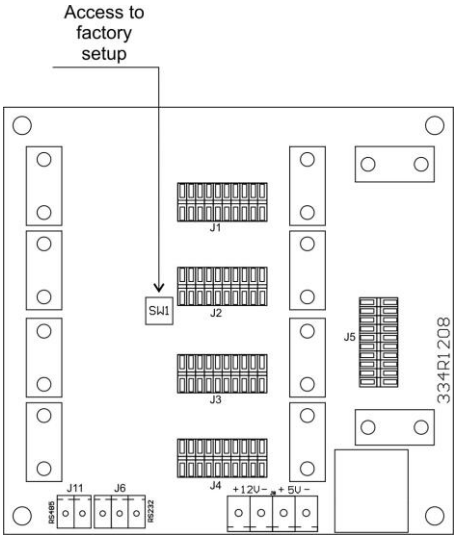
***Point A, B** – electrical connection with the housing.*
***E** – solder pad on A/D converter board.*

9. FACTORY PARAMETERS

In order to be able to edit and save factory parameters to the MW-04 mass converter's memory, it is necessary to put a jumper allowing access to the factory parameters.

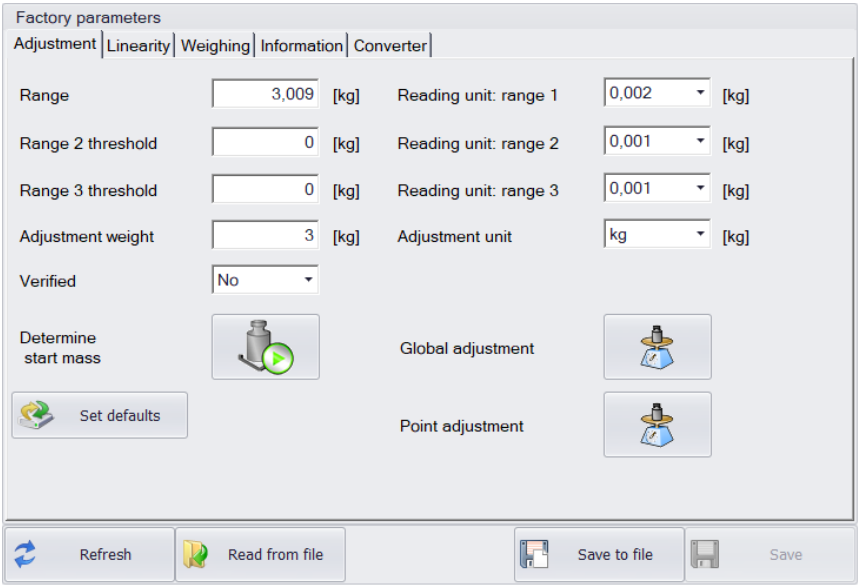
9.1. Factory Parameter Access

- Plug the power cord to the mains.
- Press **SW1** switch on the electronics board.



Factory parameters' access switch

- Wait for connection to be established between the mass converter and the **„MwManager”** software, go to **<Parameters / Factory parameters>** submenu.
- Factory parameters are set into groups: Adjustment, Weighing, Information, Converter. To access a given group, select a respective tab.



Factory parameter window

	In the case of few weighing platforms, the parameters are displayed and edited for the platform which is currently selected in the weighing result window (marked green). <Converter rate> parameter is an exception, this parameter is set globally for all available converters.

9.2. Factory Parameters

NAME	DEFAULT	VALUES	REMARKS
Adjustment	**-**	**-**	**-**
Range	3,009	-	Maximum range + 9e overload.
Range 2 threshold	0	-	Switching point of range II. For single range balances set **0**.
Range 3 threshold	0	-	Switching point of range III. For I-range or II-range scales set **0** value.
Reading unit: range 1	0.001	0.001 ÷ 50	Rounding of the last digit and position of a decimal point for weighing range I.
Reading unit: range 2	0.001	0.001 ÷ 50	Rounding of the last digit and position of a decimal point for weighing range II.
Reading unit: range 3	0.001	0.001 ÷ 50	Rounding of the last digit and position of a decimal point for weighing range III.

Adjustment weight	3	-	Adjustment weight mass.
Adjustment unit	kg	g, kg, lb	Adjustment (calibration) unit.
Verified	NO	YES - NO	Declaring whether the scale is verified or not. **YES** - verified scale, **NO** - non-verified scale.
Determine start mass	-	-	Start mass determination (refer to section 9.5.3).
Global adjustment	-	-	Global adjustment (calibration) process (read section 9.5.1).
Point adjustment	-	-	Point adjustment (calibration) process (read section 9.5.2).
Set default	-	-	Restoring default adjustment parameter settings of the active platform.
Weighing	**-**	**-**	**-**
Autozero range	0.25	0.1 ÷ 5	Autozero range (in divisions).
Stability range	1	0.1 ÷ 5	Stability range in [d] units.
Stability time	0.8	0.1 ÷ 5	Stability time, given in seconds.
Start mass control	1	0, 1, 2	Start mass control: **0** – disabled, **1** – range: from -5% to +15% of start mass, **2** – range: from -20% to +20% of start mass.
Information	**-**	**-**	**-**
A/D divisions	-	-	Current quantity of converter divisions.
Adjustment factor	100	-	Adjustment/calibration factor.
Correction factor	1	-	Correction factor value
Start mass	100	-	Start mass value (in divisions).
Gcor	1	-	Gravitational correction factor (refer to section 9.6).
Serial number	-	-	Serial number of the mass converter.
Adjustment qty counter	-	-	The quantity of factory parameter recordings.
Extension module	4I4O	4I4O, 2I6O, 8I8O, Profibus	Installed extension module support: **4I4O** – 4 inputs / 4 outputs module; **2I6O** – 2 inputs / 6 outputs module; **8I8O** – 8 inputs / 8 outputs module; **Profibus** – Profibus module.
Converter	**-**	**-**	**-**
Converter rate	10	10, 80	Converter rate change.
A/D converter and platform configuration	-	-	Configuration of A/D converters and platforms (read section 9.4).

9.3. Parameter Value Modification

- Select a parameter, enter/modify its value.
- Press **<Save>** button, Message **<Save parameters?>** is displayed.
- Press **<Yes>** button to confirm, message **<Changes saved>** is displayed.
- Press **<OK>** button to confirm.

9.4. A/D Converter and Platform Configuration

MW-04 mass converter can connect with 4 A/D converters. The used converters and weighing platforms can be freely combined, and as a result give many platform-converter variants. Devices to be constructed:

- 1-platform – multi-converter scale.
- Multiplatform – 1-converter scale.
- Any configuration (mixed).

In order to configure platforms and A/D converters, enter **<Parameters / Factory parameters / Converter>** submenu.

Procedure:

- Configure converters and weighing platforms, to do it tick the right option.

	***In the case of an attempt to assign one converter to more than one weighing platform, the following message is displayed: <Converter is already in use>. Press <OK> button to confirm and make a right choice.***

- Upon correct reconfiguration press **<Save>** button, message **<Save parameters?>** is displayed.
- Press **<Yes>** button to confirm, message **<Changes saved>** is displayed.
- Press **<OK>** button to confirm.

9.5. Factory Adjustment

The MW-04 mass converter offers two methods of determination of adjustment factor: global adjustment and point adjustment.

9.5.1. Global Adjustment

Global adjustment is carried out concurrently for all used A/D converters. Determined values of correction factors are the same for each converter, they equal 1. Global adjustment is intended for 1-load-cell devices (platforms), with one A/D converter.

Procedure:

- Go to the weighing result window, select a respective platform number.
- Unload the weighing pan.
- Press **<Global adjustment>** button, the following message is displayed:



- Load the weighing pan with weight of specified mass value and press **<OK>** button.
- Upon completion, message **<Adjustment factor determination completed successfully>** is displayed.
- Press **<OK>** button to confirm.
- Press **<Save>** button, message **<Save parameters?>** is displayed.
- Press **<Yes>** button to confirm, message **<Changes saved>** is displayed.
- Press **<Yes>** button to confirm. Determined adjustment factor, for the currently selected platform, gets saved to mass converter's memory.

9.5.2. Point Adjustment

Point adjustment is carried out separately for every single used A/D converter. Determined values of correction factors may differ for each converter.

Point adjustment is intended for multi-load-cell devices (platforms), where each load cell is connected to a different A/D converter. This method ensures automatic calculation of correction factor for each A/D converter, providing correct scale eccentricity.

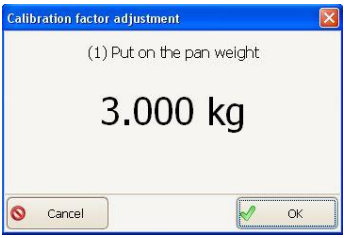
	ADC 1	ADC 2	ADC 3	ADC 4
Correction's factor	1,02723	1,04728	0,916496	1,016495
Start mass	72076	74376	69934	78826

Example of correction factors, determined in the course of point adjustment.

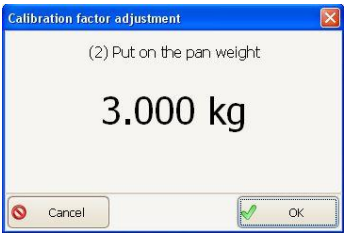
	***Adjustment factor determination is performed for a currently selected platform.***

Procedure:

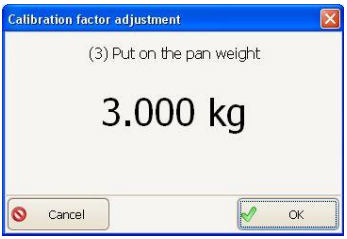
- Go to the weighing result window, select a respective platform number.
- Unload the weighing pan.
- Press **<Point adjustment>** button, the following message is displayed:



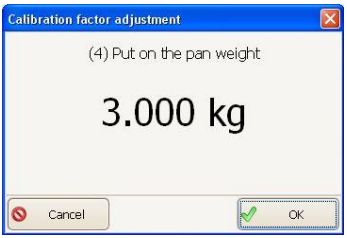
- Load the weighing pan with a weight of the specified mass value, make sure that the weight loads the first A/D converter (1).
- Press **<OK>** button, the following message is displayed:



- Load the weighing pan with a weight of the specified mass value, make sure that the weight loads the second A/D converter (2).
- Press **<OK>** button, the following message is displayed:



- Load the weighing pan with a weight of the specified mass value, make sure that the weight loads the third A/D converter (3).
- Press **<OK>** button, the following message is displayed:



- Load the weighing pan with a weight of the specified mass value, make sure that the weight loads the fourth A/D converter (4).
- Press **<OK>** button,
- Upon completion, message **<Adjustment factor determination completed successfully>** is displayed.
- Press **<OK>** button to confirm.
- Press **<Save>** button, message **<Save parameters?>** is displayed.
- Press **<Yes>** button to confirm, message: **<Changes saved>** is displayed.
- Press **<Yes>** button to confirm. Determined adjustment factor, for the currently selected platform, gets saved to mass converter's memory.

	***Upon completed point adjustment it is necessary to readjust the start mass.***

9.5.3. Start Mass Determination

- Go to the weighing result window, select a given weighing platform number.
- Unload the weighing pan.
- Go to **<Adjustment>** tab, press **<Determine start mass>** button, message **<Unload the pan>** is displayed.
- Press **<OK.>** button to confirm, start mass adjustment begins.
- Upon completion, message **<Start mass determination completed successfully>** is displayed.
- Press **<OK>** button to confirm.
- Press **<Save>** button, message **<Save parameters?>** is displayed.
- Press **<Yes>** button to confirm, message: **<Changes saved>** is displayed.
- Press **<Yes>** button to confirm. Determined start mass, for the currently selected platform, gets saved to mass converter's memory.

	***Start mass determination is performed for a currently selected platform.***

9.6. Gravitational Correction

The function of gravitational correction compensates changes of earth gravity being a result of different latitude and longitude. It enables correct calibration of the weighing device away from the place of use. The gravitational correction value must be entered with reference to tables prepared by „Radwag Balances and Scales" or calculated using the below formula:

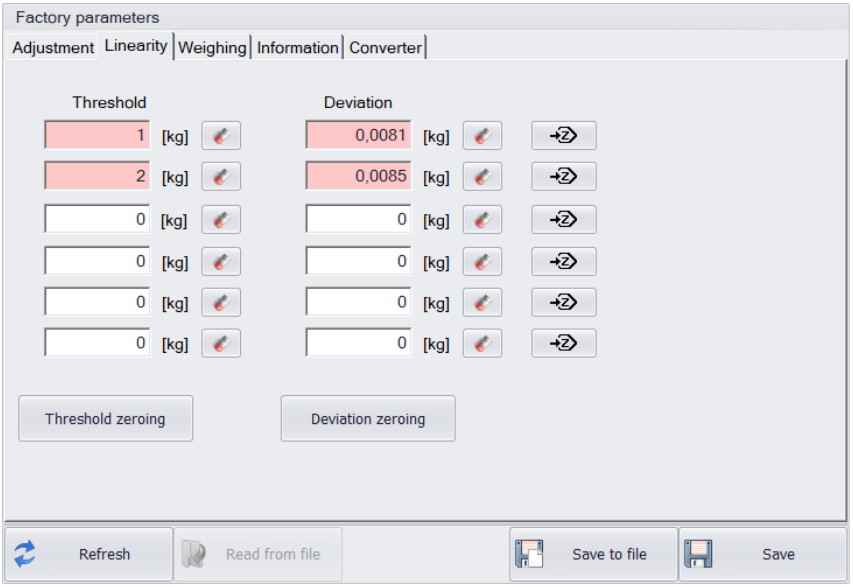
$$Gcor = \frac{g_{uzyt.}}{g_{kal.}}$$

Correction value ranges between 0.90000 ÷ 1.99999.

⚠	***If the scale is calibrated at the place of use then the gravitational correction value (<g-cor.> parameter) is 1.00000. If the scale is calibrated away from the place of use (longitudinal change) the value of <g-cor.> parameter must be corrected.***

9.7. Linearity Correction

„Linearity" tab enables access to thresholds and linearity deviations of a currently selected platform.



Linearity correction window

Where:

Zeroing limit	Press to zero threshold values.
Zeroing deviation	Press to zero threshold deviation values.
	Press to zero a value of a particular threshold / deviation.
	Press to determine a deviation of a particular threshold.

Procedure:

- Enter linearity threshold values.
- Press particular threshold button, , message **<Load xxx>** (where: xxx – entered mass value) is displayed.
- Load the weighing pan with declared mass and press **<OK>** button.
- Deviation is calculated automatically and entered in the linearity threshold deviation field.
- Determination of deviations for remaining linearity thresholds proceeds analogously.
- Press **<Save>** button to save changes, message **<Save parameters?>** is displayed.
- Press **<Yes>** button to confirm, message **<Changes saved>** is displayed.
- Press **<Yes>** button to confirm.

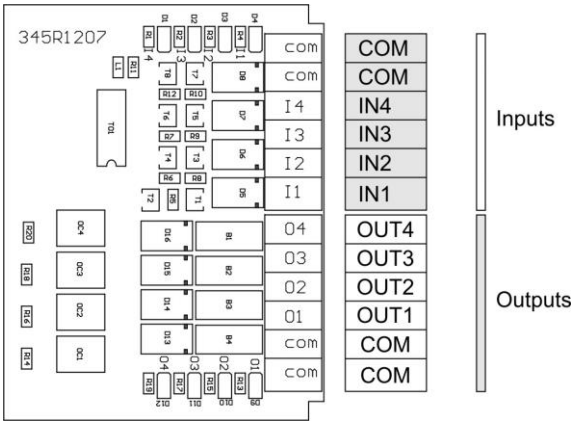
10. EXTENSION MODULES

10.1. 4IN//4OUT Module

4IN/4OUT module is installed on the main board of the MW-04 mass converter. Signals are transmitted via cables fed through cable glands.

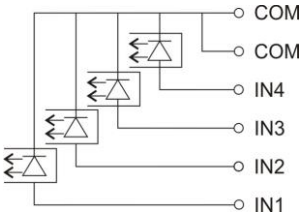
10.1.1. Technical Specifications

Output parameters	
Output quantity	4
Output type	OptoMOS
Maximum output current	0.2 ADC
Maximum output voltage	50 VDC
Input parameters	
Input quantity	4
Input type	Optoisolated
Input voltage range	5 – 24 VDC

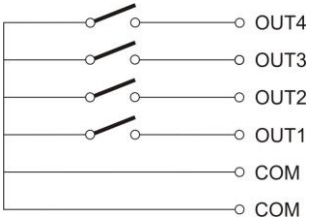


4IN//4OUT Module - terminals

10.1.2. Schematic Diagrams



4 inputs



4 outputs

10.1.3. Input / Output Signals

The signals are transmitted on two cables (cable one for inputs, cable two for outputs). See the table below for distribution of signals on cable wires.

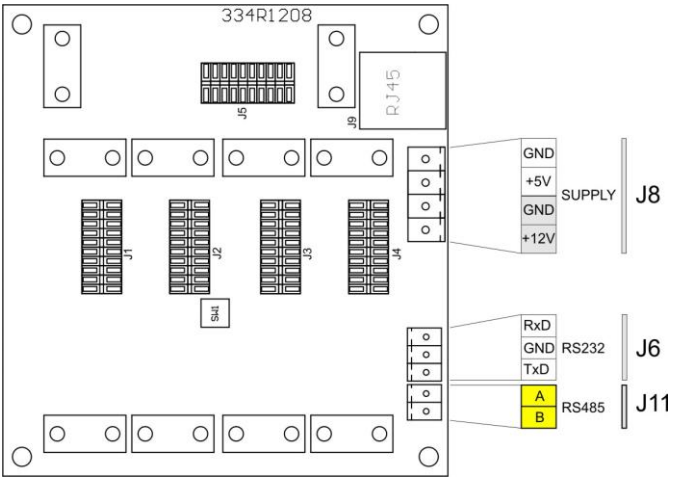
INPUTS		OUTPUTS	
Wire number	**Signal**	**Wire number**	**Signal**
1	IN1	1	OUT1
2	IN2	2	OUT2
3	IN3	3	OUT3
4	IN4	4	OUT4
5	COM	5	COM
6	+12V	6	+12V
7	GND	7	GND

+12VDC and GND signals are connected to the power supply of the MW-04 mass converter.

10.2. RS485 Module

Configuration for an alternative model of the MW-04 mass converter. Signals are transmitted via a cable fed through a cable gland M16. The cable is connected to joint J11 of the main board of MW-04 mass converter.

10.2.1. Signal Layout



Signal layout on the main board, 334Rxxx

10.2.2. RS485 Cable

See the table below for distribution of signals on cable wires.

WIRE COLOUR	SIGNAL
Green + orange	A
White-green + white-orange	B

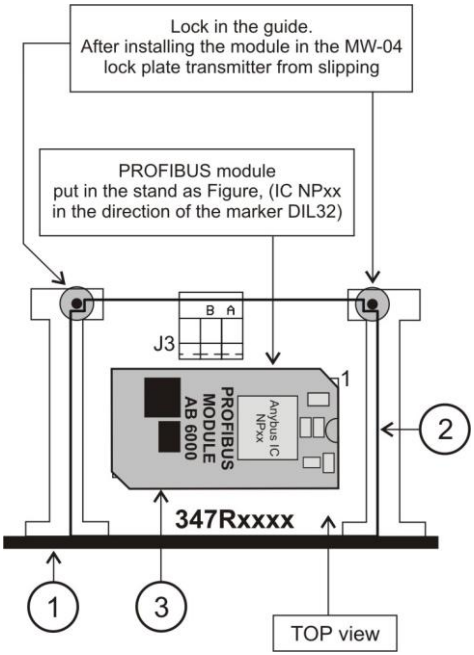
10.3. PROFIBUS Module

The MW-04-3 mass converter for PROFIBUS is equipped with input and output connectors. On the output connector there is 5 VDC voltage, this provides correct operation of a terminator. M12 5 pin B coded connectors are installed (for PROFIBUS DP).

10.3.1. Pin Arrangement

PROFIBUS IN (male)		Pin1 – NC Pin2 – A Pin3 – NC Pin4 – B Pin5 – NC
PROFIBUS OUT (female)		Pin1 - +5V Pin2 – A Pin3 – GND Pin4 – B Pin5 – NC

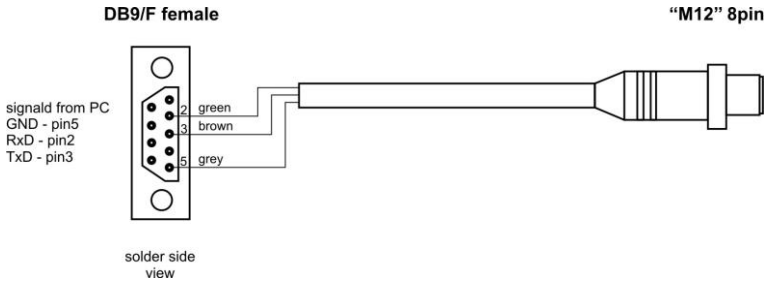
10.3.2. Interfaces Board with PROFIBUS Module Installed



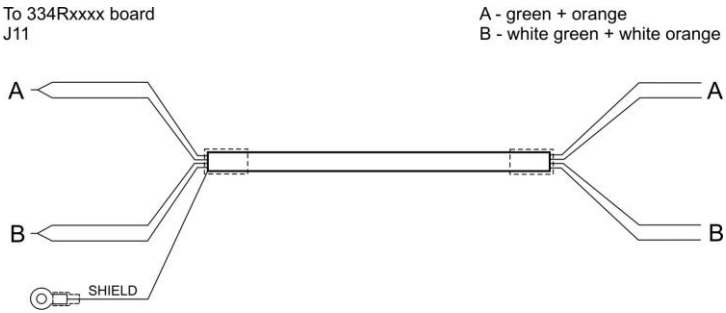
Interfaces board with PROFIBUS module installed

No.	Pcs	Name	Marking	Manufacturer
1	1	Main board	334Rxxxx Ver.B	RADWAG
2	1	PROFIBUS module board	347Rxxxx	RADWAG
3	1	PROFIBUS module	AB6000	HMS (Anybus IC)

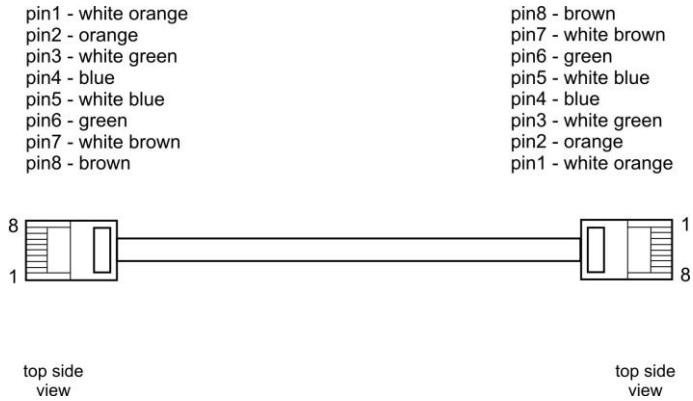
11. DIAGRAMS OF CONNECTION CABLES



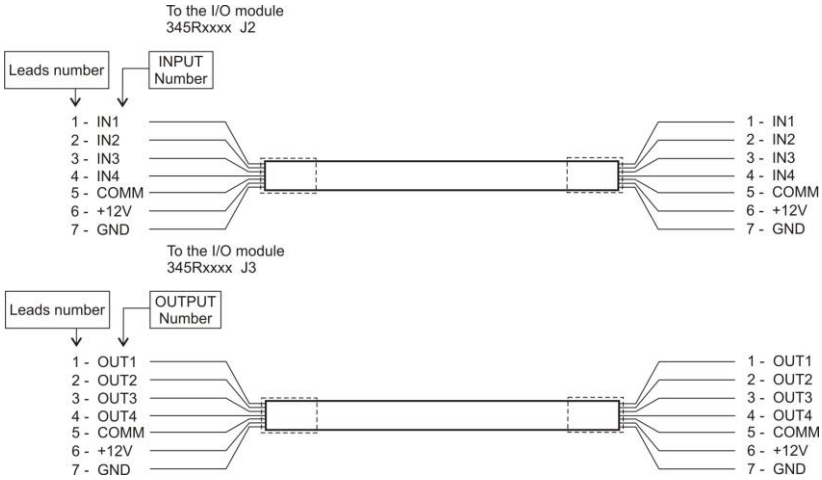
'Mass converter' – ‚computer' cable (PT0020)



'Mass converter' – *'RS485'* cable (PT0012)



'Mass converter' – ‚Ethernet' cable (*PT0224)*



'Mass converter' – ‚4IN/4OUT' cable (*PT0209)*

12. ERROR MESSAGES

Err2	Value out of zero range.
Err3	Value out of tare range.
Err8	Taring/zeroing time out of range.
NULL	Zero value from converter.
FULL	Weighing range exceeded.
HI	Display capacity out of range.
LH	Start mass error, indication out of range (-5% – +15% of start mass).