

Expert™ 1400 / Expert™ 3400 Submersible Hydrostatic Level Transmitters



Class I, Division 1
Group A-D IIC T4



Approvals

CE Certificate of conformity

This product complies with the requirements concerning electromagnetic compatibility (EMC) stipulated in Council directive no. 89/336/EEC of 3rd May 1989, altered at directive no. 92/31/EEC, on the approximation of the laws of the Member States relating to electromagnetic compatibility.

We declare that the product complies to the values stipulated in EN50014:1997, EN50020:2002, EN61000-6-3/-4:2001 and EN61000-6-1/-2:1999.

Introduction	4
Product identification	4
Safety instructions	4
Hazardous areas	4
Repair	4
Mechanical mounting	5
Model 1400	5
Model 3400	5
Model 3400 with thread top	5
Electrical mounting	6
Cable length vs. supply voltage	6
Designation of wires, cutting & stripping the cable	6
Explosion hazardous zone	7
Isolator	7
Zener barrier	7
Appendices	8
Mechanical dimensions	8
Demands for cables in explosive areas	8
Data Sheet for Expert™ 1400 Level Transmitter	9
Data Sheet for Expert™ 3400 Level Transmitter	10
Control Drawing 522218	11

Introduction

Thank you for choosing Expert™ Level Transmitter.

We have done everything possible to make a level transmitter that can fulfil all your demands.

Expert™ Level Transmitter is suitable for all kinds of level measurements. It can control and supervise levels in wells and tanks - including aggressive and polluted media.

The Expert™ Level Transmitter is both easy to install and put into service, but read this manual first - then you will get the most benefits from the Expert™ Level Transmitter right from the beginning.

You can always contact your representative or the MJK Service Hotline for advice and guidance. Also, take a look at <http://www.mjk.com>

Expert™ Level Transmitter is registered trademark of MJK.

Thank you for choosing MJK Automation A/S as your supplier of hydrostatic level transmitter.

Product identification

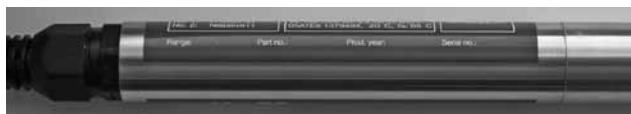
It is very important for the overall measuring accuracy that the pressure transmitter has the correct pressure range.

Check that the item(s) delivered corresponds to the ordered item(s) by means of the information on the label on the packing:



On the model 1400 transmitters, the pressure ranges together with the corresponding order numbers are printed on a label on the transmitter housing.

For all versions the pressure range is indicated on the label.



Expert 1400 Level Transmitter

On the model 3400 transmitters, the pressure ranges together with the corresponding order numbers are printed on a label on the transmitter housing.

For all versions the pressure range is indicated on the label.



Expert 3400 Level Transmitter

Safety instructions

- 1: Read this manual carefully.
- 2: Be aware of the environment on the installation site. Wear necessary protective equipment and follow all current safety regulations.
- 3: Do not operate the equipment outside the specified electrical, thermal and mechanical parameters (see datasheet for housing material). Install the device only in media for which the wetted materials have sufficient durability. Max. supply voltage is 30 VDC.
- 4: Do not connect or use any programming interface/equipment while the transmitter is located in an explosion hazardous environment.

Hazardous areas

- 1: All current local and national standards, regulations regarding installation and use of Ex or hazardous zone approved equipment, certifications and safety instructions for Ex equipment that have been used together with the installation of the Expert 1400 or 3400 level transmitter must be strictly observed.
- 2: The use of an approved zener barrier or isolator is mandatory when installing Expert™ Level Transmitter 1400 and 3400 in explosion hazardous areas.

Repair

- 1: Repair of Ex approved equipment must only be made by MJK or by a service representative approved by MJK.

Mechanical mounting

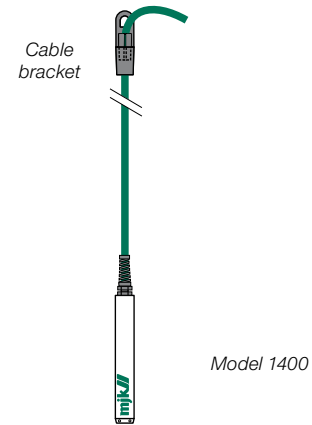
Model 1400

1: Mount a suitable hook over the desired measuring location. Note the weight of the cable.

2: Remove the inner conical sleeve from the cable fitting and pull the cable through the outer part. Open the inner sleeve and fit it around the cable at the desired fixation point and press the inner sleeve into place in the outer part. Secure the cable fitting by pulling the cable downwards.

3: Lower the pressure transmitter into the wellpipe.

Take care not to hit the bottom hard since it may damage the transmitter!



Model 3400

1: Mount a suitable hook over the desired measuring location. Note the weight of the cable.

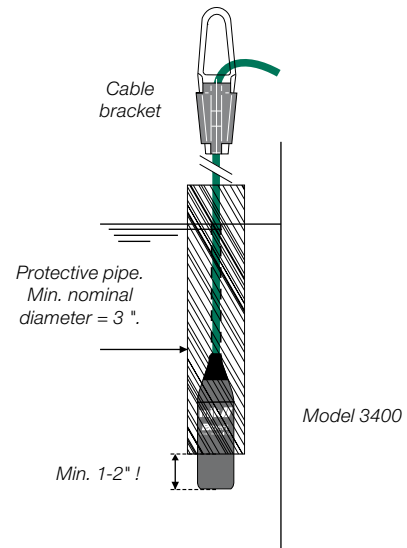
2: Mount the cable fitting onto the cable. Open the fitting by sliding the two plastic jaws upwards, place the cable between the jaws and slide the jaws downwards until the cable locks. Secure the cable fitting by pulling the cable downwards.

3: Lower the pressure transmitter into the liquid.

Take care not to hit the bottom hard since it may damage the transmitter!

4: If the transmitter is to be used in a wetwell or other locations with turbulence or other disturbance, it is advisable to install a pipe (min. nominal diameter = 3") to protect the transmitter from bumping into the wall or other components.

It is very important that minimum 1" of the pressure transmitter is not being covered by the pipe!

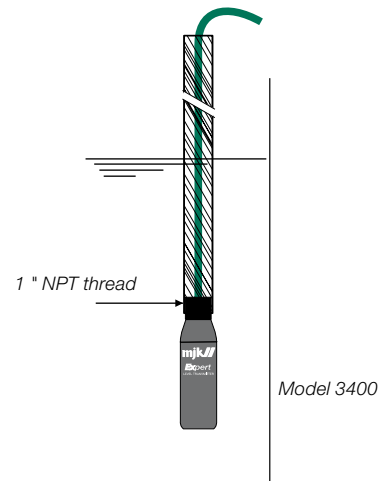


Model 3400 with thread top

1: Mount the pressure transmitter onto a 1 in pipe (1" NPT thread) and mount the pipe firmly at the desired measuring location.

2: Lower the pressure transmitter into the liquid.

Take care not to hit the bottom hard since it may damage the transmitter!



Electrical mounting

Cable length vs. supply voltage

The cable can be lengthened with any type of cable using connection box 202922. Although the measuring signal is not sensitive to electrical noise, we recommend the use of a screened cable.

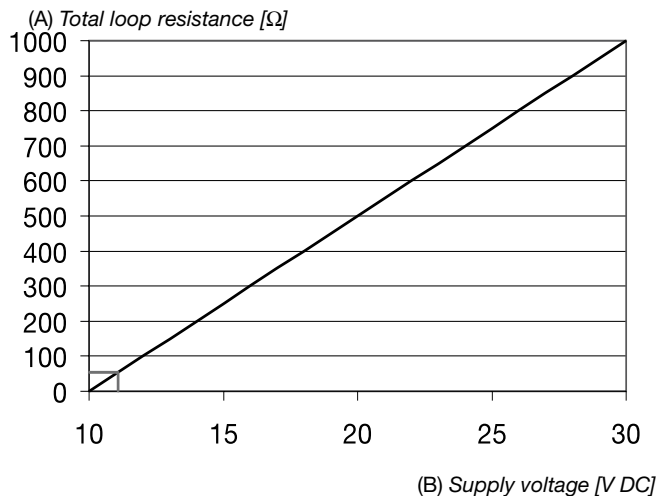
Ensure that no moisture can enter the pressure compensation tube inside the cable.

The length of the cable is only limited by the total resistance (A) of the cable conductors + the input impedance of the analog input on the MJK 704, MJK 713, PLC etc. (typically 10 to 100 Ω) and the available supply voltage (B) (typically 24 V DC).

Example:

The nominal resistance for 1 conductor in a transmitter cable is 0.011 Ω /ft. A standard 39 ft cable will therefore add $2 \times 0.011 \times 39 = 0.86 \Omega$ to the loop resistance. If the analog input has an impedance of 50 Ω ., the total resistance will be approx. 51 Ω .

Necessary supply voltage in relation to the total loop resistance.



According to the diagram above, approx. 12 V DC will be sufficient.

Designation of wires, cutting & stripping the cable

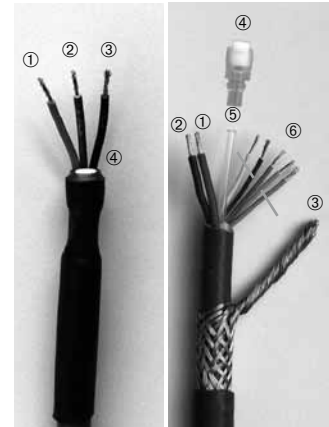
The factory delivered cable has the wires marked with the numbers 1 - 2 - 3 as indicated below. If the cable needs to be cutted and stripped, the shield should be connected as the no. 3 wire.

Do NOT connect any of the colored programming wires as it may damage the transmitter. The programming wires should be cut off in different lengths to prevent them from short circuit.

Take care not to block or squeeze the air pressure compensation tube ⑤.

Designations:

- 1: Positive (+) wire, red
- 2: Negative (-) wire, braun
- 3: Shield (NOT signal ground!)
- 4: Moisture filter for compensation tube
- 5: Air pressure compensation tube
- 6: Programming wires



Factory delivery.

Cutted and stripped.

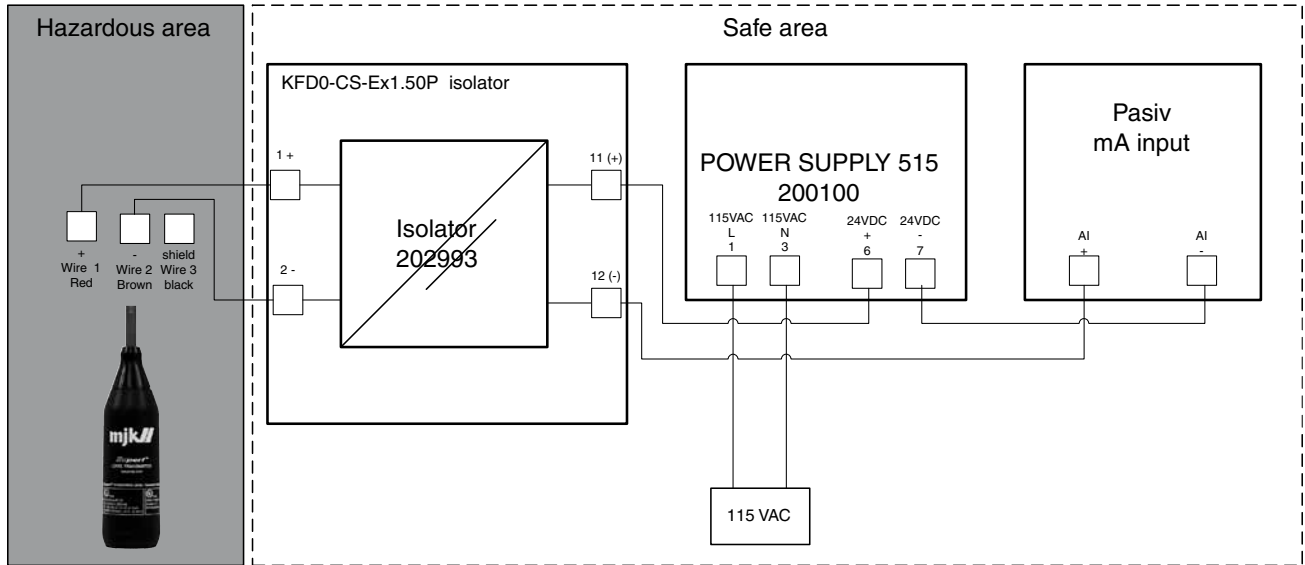
Do not connect a programming unit to the transmitter or make any attempt to program the transmitter while the transmitter is located in an explosion hazardous zone!

Explosion hazardous zone

The insulation between the intrinsic safe circuit and the enclosure withstands 500 V AC.

Isolator

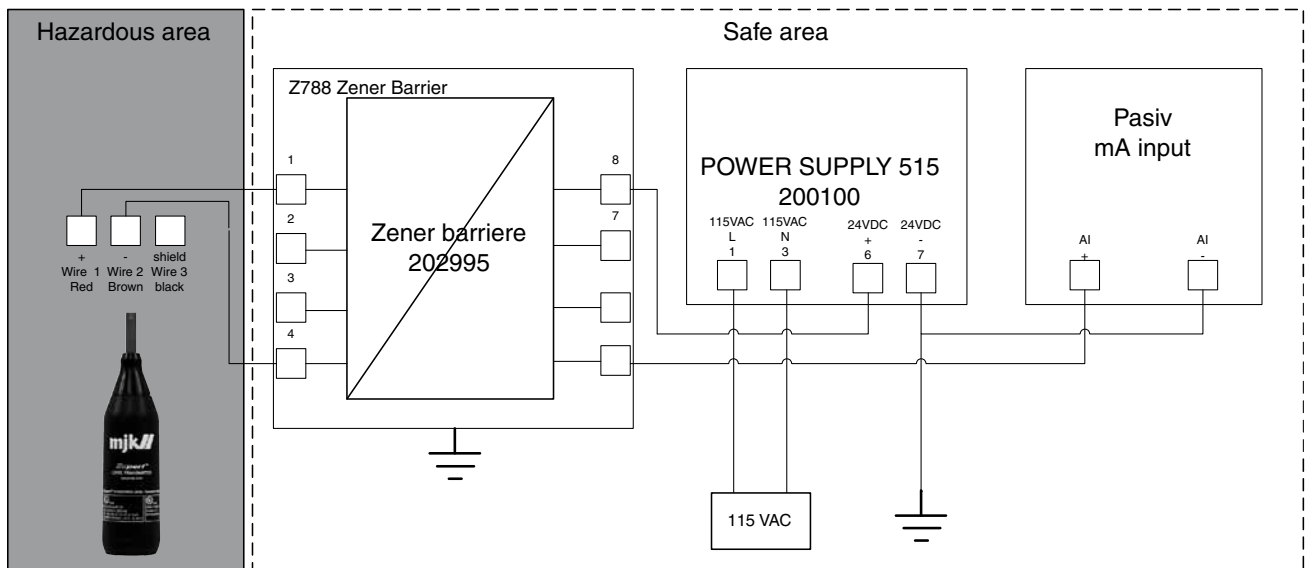
The KFD0-CS-Ex1.50P isolator (MJK part no.: 202993) which supplies the pressure transmitter through a galvanic separator so neither current nor voltage exceeds the specified limits.



Zener barrier

The Z788 Zener Barrier (MJK part no. 202995) has a safety fuse which will blow if the current exceeds the limit.

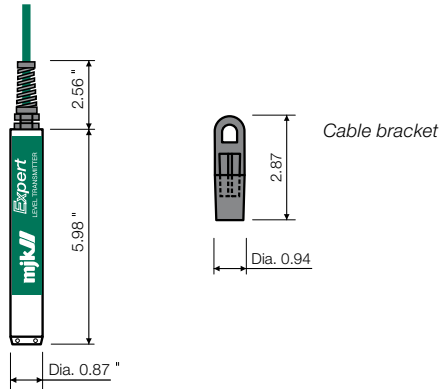
The voltage protection in the Zener barrier contains a number of zener diodes, which are connected from each signal cable to ground.



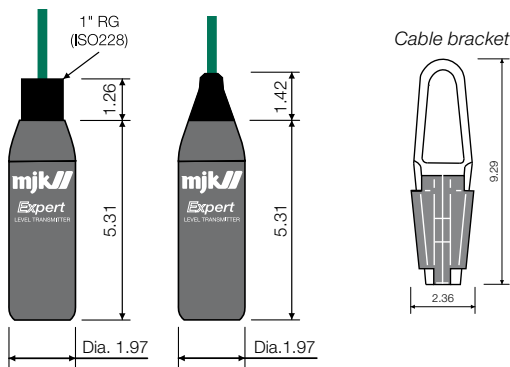
Appendices

Mechanical dimensions

MJK model 1400
Level transmitter



MJK model 3400
Level transmitter



Demands for cables in explosive areas

Using the the KFD0-CS-Ex1.50P isolator (MJK order no.: 202993) the max cable length can be calculated.

The Cmax and Lmax for the isolator in explosion group IIC are: Cmax : 2.41µF, Lmax : 4 mH. The capacity of MJK cable type 691005 or 691004 is < 245 pF/ft. and the inductance is <0.450 µH/ft. and the capacity and the inductance of the Expert Level Transmitter is Ci = 3.5 nF Li = 7 µH. Cable length based on the capacity:

Max.cable length = (Cmax-Ci)/Ccable = 422 ft.

Cable length based of the inductance:

Max. cable length = (Lmax-Li)/Lcable = 9,540 ft.

In this case the capacitance sets the limit of the cable length to 422 ft. If another approved isolator or another cable is used the max. cable length must be recalculated.

Using The Z788 Zener Barrier (MJK Order no. 202995) the max cable length can be calculated. The Cmax and Lmax for the zener barrier in explosion group IIC are: Cmax : 83 nF, Lmax : 3.05 mH. The capacity of MJK cable type 691005 or 691006 is < 245 pF/ft. and the inductance is < 0.450 µH/ft. and the capacity and the inductance of the Expert Level. Transmitter is Ci = 3.5 nF Li = 7 µH. Cable length based on the capacity:

Max. cable length = (Cmax-Ci)/Ccable = 324 ft.

Cable length based on the inductance:

Max. cable length = (Lmax-Li)/Lcable = 6,650 ft.

In this case the capacitance sets the limit of the cable length to 324 ft. If another approved isolator or another cable is used the max. cable length must be recalculated.

Data Sheet for Expert™
1400 Level Transmitter



MJK Expert™ 1400 Level Transmitter has about the same specifications as the 1100 model. In addition it has a ceramic, capacitive measuring system with a much higher accuracy. Furthermore, Expert™ 1400 is approved for use in explosion hazardous areas. (UL Class 1, Division 1, Group A-D)

Model 1400 is very useful for level measurements in for example ground water bore holes and in-fill sites, where explosion proof transmitters are required.

Specifications

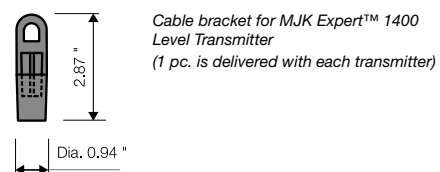
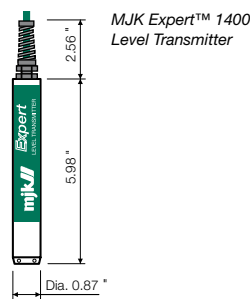
MJK Expert™ 1400 Hydrostatic Level Transmitter								
Nominal measuring range	0 - 1 ft.	0 - 3 ft.	0 - 10'	0 - 15'	0 - 30'	0 - 100'	0 - 300'	0 - 1000'
Measuring principle	Ceramic capacitive, relative pressure							
Min. programmable range	0 - .9 ft.	0 - .9 ft.	0 - 3 ft.	0 - 10'	0 - 9'	0 - 30'	0 - 90'	0 - 300'
Max. programmable range	0 - 3 ft.	0 - 3 ft.	0 - 10'	0 - 30'	0 - 30'	0 - 100'	0 - 300'	0 - 1000'
Max. overpressure	75 psi	75 psi	100 psi	150 psi	150 psi	275 psi	600 psi	600 psi
Temperature range	-5 °F to 105 °F							
Temp. deviation, zero point	Better than ± 0.01 % / °F							
Temperature deviation, FS	Better than ± 0.005 % / °F							
Linearity / Stability	Better than ± 0.2 % FS / ± 0.2 % FS							
Measurement accuracy	Better than ± 0.1 % FS @ 50 to 85 °F Better than ± 0.2 % FS @ full temperature range							
Long time stability	Better than ± 0.1 % FS per year							
Materials	Housing: stainless steel (AISI 316 L), diaphragm: 96,6 % Al ₂ O ₃ /Cell packing: Viton®							
Supply voltage	10 - 30 V DC (12 - 30 V DC for cable lengths above 315 ft.)							
Output signal	2-wire 4 - 20 mA (passive transmitter)							
Cable	2 × AWG 20 (pressure) + 5 × AWG 25 (data), shielded, PUR insulation							
Cable length	39 ft.	39 ft.	39 ft.	39 ft.	39 ft.	115 ft.	350 ft.	1005 ft.
Enclosure	NEMA 6P, withstands a static pressure equal to max. overpressure.							
Approvals	UL® Class 1 Division 1 Group A-D							

[®] Can be delivered with other cable lengths on request.

Order Numbers

Order Numbers			
209911	Expert™ 1400, range 0 - 0.3 ft. WG	209916	Expert™ 1400, range 0 - 30 ft. WG
209912	Expert™ 1400, range 0 - 1 ft. WG	209917	Expert™ 1400, range 0 - 100 ft. WG
209913	Expert™ 1400, range 0 - 3 ft. WG	209918	Expert™ 1400, range 0 - 300 ft. WG
209914	Expert™ 1400, range 0 - 5 ft. WG	209925	Expert™ 1400 w/ special meas. range
209915	Expert™ 1400, range 0 - 10 ft. WG	All 1400 transmitters are UL approved.	

Dimensions and
Accessories



Data Sheet for Expert™
3400 Level Transmitter



MJK Expert™ 3400 Level Transmitter is designed for use in waterworks, sewage treatment plants and industrial applications where accurate and long term stable level measuring is required. It is very robust and designed for applications in rough environments with aggressive chemicals and aggressive fluids.

A major design feature is the programming facility. With a standard USB interface and a laptop computer, the servicing transmitter can be programmed on-the-fly to the required measuring range.

Specifications

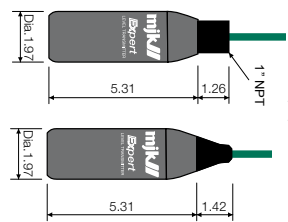
MJK Expert™ 3400 Hydrostatic Level Transmitter								
Nominal measuring range	0 - 1 ft.	0 - 3 ft.	0 - 10'	0 - 15'	0 - 30'	0 - 100'	0 - 300'	0 - 1000'
Measuring principle	Ceramic capacitive, relative pressure							
Min. programmable range	0 - .9 ft.	0 - .9 ft.	0 - 3 ft.	0 - 10'	0 - 9'	0 - 30'	0 - 90'	0 - 300'
Max. programmable range	0 - 3 ft.	0 - 3 ft.	0 - 10'	0 - 30'	0 - 30'	0 - 100'	0 - 300'	0 - 1000'
Max. overpressure	75 psi	75 psi	100 psi	150 psi	150 psi	275 psi	600 psi	600 psi
Temperature range	-5 °F to 105 °F							
Temp. deviation, zero point	Better than ± 0.01 % / °F							
Temperature deviation, FS	Better than ± 0.005 % / °F							
Linearity / Stability	Better than ± 0.5 % FS / ± 0.5 % FS							
Measurement accuracy	Better than ± 0.1 % FS @ 50-85 °F, and better than ± 0.2 % FS @ full temp. range							
Long time stability	Better than ± 0.1 % FS per year							
Materials	Housing: PPS, diaphragm: 99,9 % Al ₂ O ₃ and measurement cell packing: Viton®							
Supply voltage	10 - 30 V DC (12 - 30 V DC for cable lengths above 315 ft.)							
Output signal	2-wire 4 - 20 mA (passive transmitter)							
Cable	2 × AWG 20 (pressure) + 5 × AWG 25 (data), shielded, PUR insulation							
Cable length	39 ft.	39 ft.	39 ft.	39 ft.	39 ft.	115 ft.	350 ft.	1005 ft.
Enclosure	NEMA 6P, withstands a static pressure equal to max. overpressure							
Approvals	UL® Class 1 Division 1 Group A-D							

^① Can be delivered with other cable lengths on request.

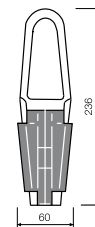
Order numbers

Order Numbers			
209921	Expert™ 3400, range 0 - 1 ft. WG	209928	Expert™ 3400, range 0 - 1000 ft. WG
209922	Expert™ 3400, range 0 - 3 ft. WG	209991	Expert™ 3400, range 0 - 1 ft. 1" NPT top
209923	Expert™ 3400, range 0 - 10 ft. WG	209992	Expert™ 3400, range 0 - 3 ft. 1" NPT top
209925	Expert™ 3400, range 0 - 30 ft. WG	209993	Expert™ 3400, range 0 - 10 ft. 1" NPT top
209926	Expert™ 3400, range 0 - 100 ft. WG	209996	Expert™ 3400, range 0 - 100 ft. 1" NPT top
209927	Expert™ 3400, range 0 - 300 ft. WG	202926	Expert™ 3400 w/ special meas. range

Dimensions and Accessories



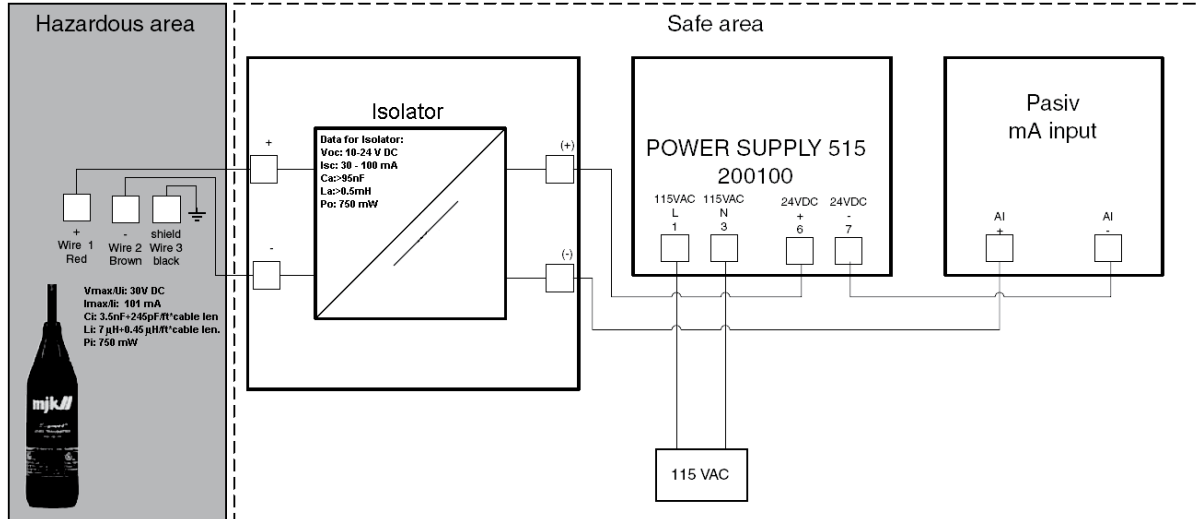
MJK Expert™ 3400 Level Transmitter



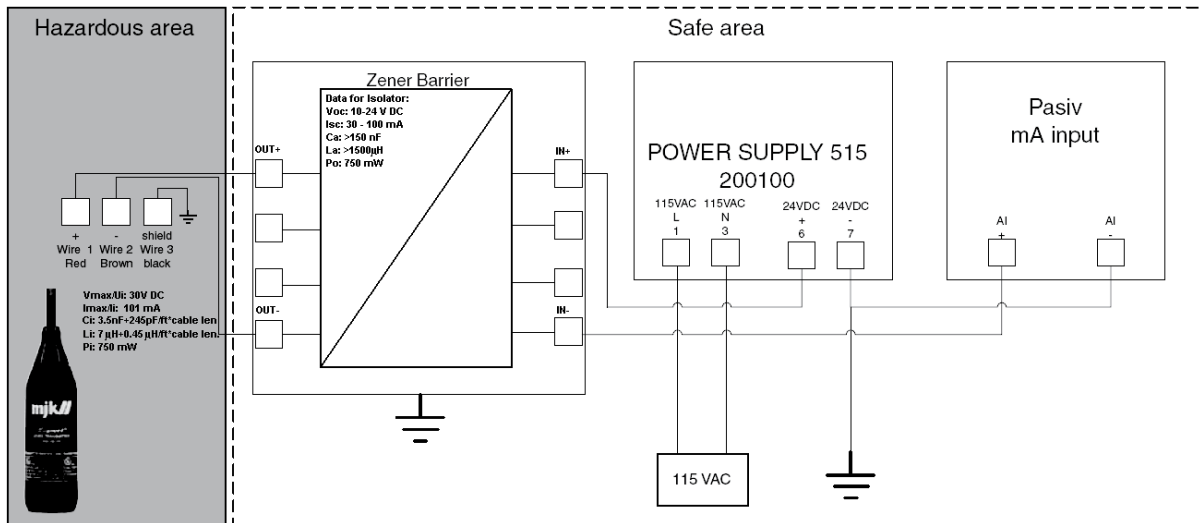
Cable bracket for MJK model 3400 (1 pc. is delivered with each transmitter)



Class I Division 1
Group A-D



If KFD0-CS-Ex1.50P isolator (MJK order no.: 202993) is used
 The max. cable length is calculated using the following data from the Isolator : Cext.<107nF, Lext.<4.3 mH for explosion group IIC. Cable data: Ccable<=245 pF/ft Lcable<=0,45μH/ft.
 Max. Length of cable is (107 nF-3,5nF)/245pF/ft=422ft . (4.3mH-7μH)/0,45μH/ft=9,540ft
 The Capacitance of the cable sets the limit. Max. cable length = 422ft



If Z788 Zener Barrier BAS 01 ATEX 7005 (MJK Order no. 202995) is used
 The max. cable length is calculated using the following data from the Zener barrier: Cmax=83 nF, Lmax=3.05 mH.
 For explosion group IIC. Cable data: Ccable=245pF/ft Lcable=0.45 μH/ft.
 Max length of cable is: (83 nF-3,5 nF)/245pF/ft=324 ft, (3.05mH-7μH)/0.45μH/ft=6,650ft
 The Capacitance sets the limit. Max. cable length = 324 ft.

If other isolators or Zener barriers are used, the cable length has to be recalculated.
 For further information read the manual and datasheet.

Only for terminal use must not be summarized	E			MJK AUTOMATON A/S Byageren 7 DK-2850 Nærum Fax: +45 45 56 06 46 Tel.: +45 45 56 06 56	Date: 17-3-2005	
	D	22-1-2007			New opto-isolator	Constructor: LL
	C	25-9-2006			New calculations on cable length	Part no.:
	B	22-9-2006			New calculations on cable length	Drawing no.:
	A	17-7-2006			New Control Drawing	522218
	Date		Control drawing for Expert Level Transmitter Type 1400 and 3400 in hazardous area.			
	Scale:					

