

temperature



### Inserts for JOFRA dry-blocks

ITC-155	-23 to 155°C / -9 to 311°F
ITC-320	33 to 320°C / 91 to 608°F
ITC-650	33 to 650°C / 91 to 1202°F
CTC-140	-17 to 140°C / -1 to 284°F
CTC-320	33 to 320°C / 91 to 608°F
CTC-650	33 to 650°C / 91 to 1202°F
CTC-1200	300 to 1205°C / 572 to 2200°F
MTC-140	-17 to 140°C / -1 to 284°F
MTC-320	33 to 320°C / 91 to 608°F
MTC-650	33 to 650°C / 91 to 1202°F

## for temperature dry-blocks Insertion Tubes



From time to time we get information from end-users of JOFRA dry-block calibrators that something is wrong with the calibrator, as it is not able to meet the temperature specifications.

This is often due to the fact that the customer is using a wrong insertion tube, although he is in good faith.

Therefore, you can save a lot of time and irritations by using the right insertion tube.

### Does and don't's in the use of inserts

#### Important things to REMEMBER when using inserts:

- Remove inserts from the well with the insert removal tool.
- Remove the inserts after calibration, as it might cause problems to remove them later on if they stay in the well for longer periods.
- Take care when removing very hot or cold inserts and use adequate protective equipment if necessary.
- Make certain that the sensors and inserts are free from any particles of dirt before inserting them into the well. Inserts are designed to fit perfectly into the well thus maximizing the thermal conductivity. If not the insert may be jammed.
- Remove regularly build-up of dirt and dust from inserts and wells with a cloth or detergent.

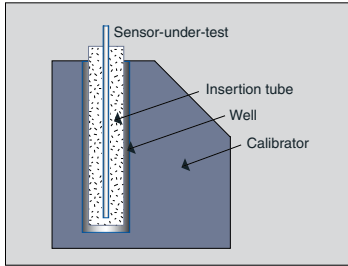
#### Important things to AVOID when using inserts:

- Do not force inserts or sensors into the well.
- Do not drop any foreign materials into the well.
- Do not use oil or other liquids to optimise the thermal conductivity due to risk of leakage, which will destroy the other components.
- Do not use inserts of metals dissimilar to that of the block, unless specified by the manufacturer as this may cause a different degree of expansion and contraction.

ISO 9001 Manufacturer

Specification Sheet  
AS-Insertion Tubes

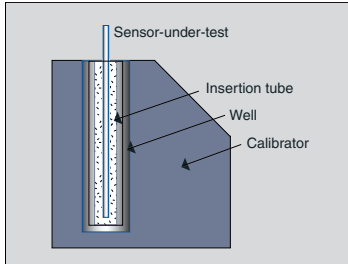
## USING INSERTS



### Using inserts from other JOFRA calibrators

Often customers believe that they can use inserts from other models of JOFRA temperature calibrators. Consequently, we get complaints about errors in the temperature specifications.

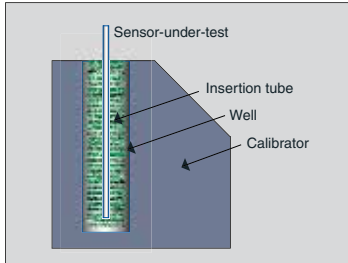
Even if the diameter is right, the length might not be. In this case the insertion tube is too tall. This gives a heat flow out of the top of the well and the temperature uniformity will change dramatically.



### Using inserts that are too small

Using insertion tubes with diameters that are too small creates another problem. The heat transfer between the well and the insertion tube is insufficient, as the air around the tube has an insulating effect. This will make the temperature very unstable and unable to reach the set value.

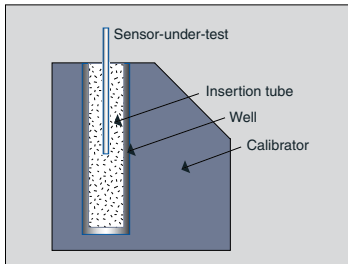
This problem also applies to the use of 6 mm and 1/4 in (6.35 mm) sensor holes. Even though this combination may seem to match it gives a very poor heat transfer as the sensors do not have an even contact with the insertion tube.



### Using inserts made of the "wrong" material

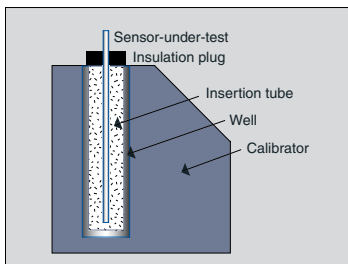
Home-made inserts can be made in a very professional way with the correct length and size, but the material used for the inserts might cause problems and wrong results. If the specifications e.g. apply to a brass insert, it is not a good idea to use inserts made of aluminum or other materials due to the difference in conductivity.

To get the right result and to make the calibrator measure correctly, it is therefore extremely important to use the right material for the inserts.



### Using inserts with too short sensor holes

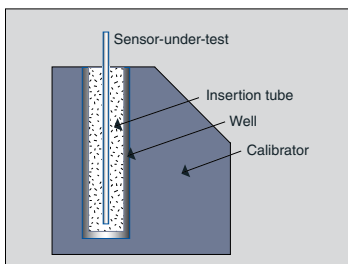
When drilling your own inserts it is a common mistake to make the sensor holes too short. Using this kind of insert may influence the temperature gradient, as the calibrator was originally calibrated at the bottom of the well.



### Using inserts without using an insulation plug

All JOFRA cooling temperature calibrators are delivered with an insulation plug, to be placed on top of the well. The design of this type of calibrators require such a device, and the calibrators have also been calibrated with the insulation plug.

There is a large heat flow out of the well, and if the plug is not used during calibration, it will cause problems reaching the set temperature of the calibrator.



### Using inserts with the correct size, holes and material

To avoid problems, waste of time and to get the optimum use of your calibrator we recommend that you use inserts from AMETEK Calibration Instruments as they follow our specifications.

## PREDRILLED INSERTS FOR CTC AND MTC SERIES

Inserts for CTC-140 A and CTC-320 A/B are made of aluminum. Inserts for CTC-650 A/B are made of brass. Inserts for CTC-1200 A are made of high-temperature steel alloy. All specifications on hole sizes are referring to the outer diameter (OD) of the sensor-under-test. The correct clearance size is applied in all predrilled inserts.

Inserts, undrilled						
Inserts	Instruments					
	CTC/MTC-140 A <sup>2</sup>	CTC/MTC-320 A	CTC/MTC-650 A	CTC-320 B	CTC-650 B	CTC-1200 A <sup>4</sup>
5-pack, undrilled inserts	60F448	100175	100194	60F356	60F420	124403
Undrilled insulation plug	123937	N/A	N/A	N/A	N/A	see below <sup>4</sup>

Spare part no. for predrilled inserts - metric (mm)									
Probe diameter	Insert code <sup>1</sup>	Instruments						CTC-1200 A <sup>4</sup>	
		CTC/MTC-140 A <sup>2</sup>	CTC/MTC-320 A	CTC/MTC-650 A	CTC-320 B	CTC-650 B	Inserts	Insulation plugs	
									CTC-1200 A <sup>4</sup>
3 mm	003	123428	123436	123444	N/A	N/A	124503	124415	
4 mm	004	60F451	100177	100196	60F359	60F423	124406		
5 mm	005	123429	123437	123445	123452	123460	124504	124416	
6 mm	006	60F453	100179	100198	60F361	60F425	124407		
7 mm	007	123430	123438	122516	123453	123461	124505	124518	
8 mm	008	105185	100182	100201	105190	105195	124506		
9 mm	009	105186	100183	100202	105191	105196	124507	124519	
10 mm	010	105187	100185	105188	105192	105197	124508		
11 mm	011	123431	100188	100204	105193	105198	124509	124414	
12 mm	012	123432	100186	100206	105194	105199	124510		
13 mm	013	123433	60F339	105189	123454	123462	N/A	N/A	
14 mm	014	N/A	100190	100208	123455	123463	N/A		
15 mm	015	N/A	100191	100209	123456	123464	N/A		
16 mm	016	N/A	123439	123446	123457	123465	N/A		
18 mm	018	N/A	123440	122517	123458	123466	N/A		
20 mm	020	N/A	123441	122518	123459	123467	N/A		
Package of the above inserts		124679	124681	124685	124683	124687	124689		
Multi-hole type 1	M01	123479 <sup>3</sup>	123475	123476	N/A	N/A	N/A		

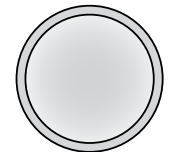
Spare part no. for predrilled inserts - imperial (inch)									
Probe diameter	Insert code <sup>1</sup>	Instruments						CTC-1200 A <sup>4</sup>	
		CTC/MTC-140 A <sup>2</sup>	CTC/MTC-320 A	CTC/MTC-650 A	CTC-320 B	CTC-650 B	Inserts	Insulation plugs	
									CTC-1200 A <sup>4</sup>
1/8 in	125	60F450	100176	100195	60F358	60F422	124511	124415	
3/16 in	187	60F452	100178	100197	60F360	60F424	124512	124416	
1/4 in	250	60F454	100180	100199	60F362	60F426	124404		
5/16 in	312	60F456	100181	100200	60F364	60F428	124513	124518	
3/8 in	375	60F458	100184	100203	60F366	60F430	124514	124519	
7/16 in	437	60F460	100187	100205	60F368	60F432	124515		
1/2 in	500	60F462	100189	100207	60F370	60F434	124405	124414	
9/16 in	562	60F464	60F344	60F408	60F372	60F436	N/A	N/A	
5/8 in	625	60F466	100192	100210	60F374	60F438	N/A		
11/16 in	688	N/A	60F348	60F412	60F376	60F440	N/A		
3/4 in	750	N/A	100193	100211	60F378	60F442	N/A		
13/16 in	813	N/A	60F352	60F416	105184	60F444	N/A		
7/8 in	875	N/A	60F354	60F418	60F377	60F446	N/A		
Package of the above inserts		124680	124682	124686	124684	124688	124690		
Multi-hole type 2	M02	123480 <sup>3</sup>	123477	123478	N/A	N/A	N/A		

Note 1: Use the insert code, when ordered as the standard insert together with a new calibrator.

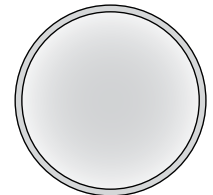
Note 2: CTC-140 A only: Remember to use matching insulation plugs.

Note 3: CTC-140 A only: All multi-hole inserts are delivered with a matching insulation plug.

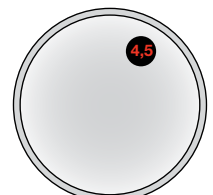
Note 4: CTC-1200 A only: Remember to order matching insulation plugs.



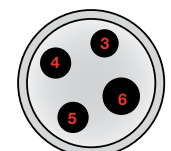
Undrilled inserts (CTC/MTC-140 A)



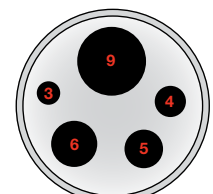
Undrilled inserts (CTC/MTC-320 / 650 A/B)



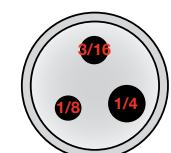
Undrilled inserts (CTC-1200 A)



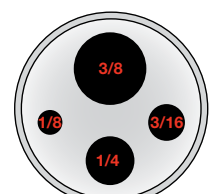
Multi-hole type 1 (CTC/MTC-140 A)



Multi-hole type 1 (CTC/MTC-320 A / 650 A)



Multi-hole type 2 (CTC/MTC-140 A)



Multi-hole type 2 (CTC/MTC-320 A / 650 A)

**PREDRILLED INSERTS FOR ATC AND ITC SERIES - 4 MM REFERENCE HOLE**

JOFRA dry-block insert compatibility and materials:

ATC-320 = ATC-650 = ITC-320 = ITC-650 (made of brass)

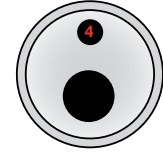
ATC-125 = ATC-155 = ATC-156 (made of aluminum)

ATC-157 = ITC-155 (made of aluminum)

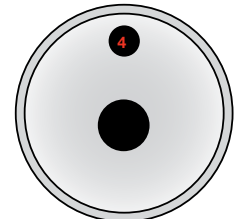
All specifications on hole sizes are referring to the outer diameter (OD) of the sensor-under-test.

The correct clearance size is applied in all predrilled inserts.

Spare part no. for predrilled inserts with 4 mm reference hole						
		Instruments				
Probe diameter	Insert code <sup>1</sup>	ATC-125 A/B	ATC-155/156 A/B	ATC-157 A/B	ATC-320/650 A/B ITC-320/650 A	ITC-155 A
3 mm	003	105623	105623	123270	105622	123270
4 mm	004	105625	105625	123271	105624	123271
5 mm	005	105627	105627	123272	105626	123272
6 mm	006	105629	105629	123273	105628	123273
7 mm	007	105631	105631	123274	105630	123274
8 mm	008	105633	105633	123275	105632	123275
9 mm	009	105635	105635	123276	105634	123276
10 mm	010	105637	105637	123277	105636	123277
11 mm	011	105639	105639	123278	105638	123278
12 mm	012	105641	105641	123299 <sup>2</sup>	105640	123299 <sup>2</sup>
13 mm	013	105643	105643	123300 <sup>2</sup>	105642	123300 <sup>2</sup>
14 mm	014	105645	105645	N/A	105644	N/A
15 mm	015	105647	105647	N/A	105646	N/A
16 mm	016	105649	105649	N/A	105648	N/A
Package of the above inserts	-	124697	124697	124699	124701	124699
Set of insulation plugs for 4 mm reference hole	-	126234	105810	123374	N/A	N/A



(ATC-157 A/B and ITC-155 A)



(ATC-125/155/156/320/650 A/B and ITC-320/650 A)

Spare part no. for predrilled inserts with 4 mm reference hole						
		Instruments				
Probe diameter	Insert code <sup>1</sup>	ATC-125 A/B	ATC-155/156 A/B	ATC-157 A/B	ATC-320/650 A/B ITC-320/650 A	ITC-155 A
1/8 in	125	105677	105677	123279	105676	123279
3/16 in	187	105679	105679	123280	105678	123280
1/4 in	250	105681	105681	123281	105680	123281
5/16 in	312	105683	105683	123282	105682	123282
3/8 in	375	105685	105685	123283	105684	123283
7/16 in	437	105687	105687	123301 <sup>2</sup>	105686	123301 <sup>2</sup>
1/2 in	500	105689	105689	123302 <sup>2</sup>	105688	123302 <sup>2</sup>
9/16 in	562	105691	105691	N/A	105690	N/A
5/8 in	625	105693	105693	N/A	105692	N/A
Package of the above inserts	-	124698	124698	124700	124702	124700
Set of insulation plugs for 4 mm reference hole	-	126234	105810	123374	N/A	N/A

ATC-series



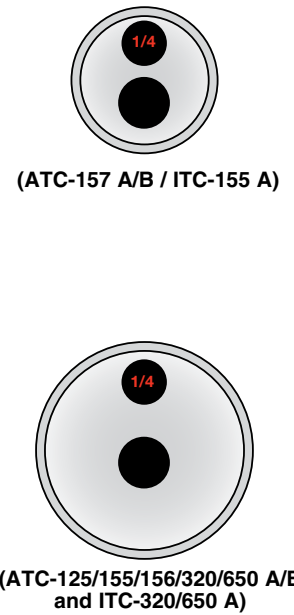
Note: All inserts (metric and inches) are supplied with a hole for the 4 mm OD reference sensor.

Note 1: Use the insert code, when ordered as the standard insert together with a new calibrator.

Note 2: ATC-157 / ITC-155: 12 mm, 13 mm, 7/16 in and 1/2 in inserts are delivered without the 4 mm reference hole, but supplied with a matching insulation plug.

**PREDRILLED INSERTS FOR ATC AND ITC SERIES - 1/4 INCH REFERENCE HOLE**

Spare part no. for predrilled inserts with 1/4 in (6.35 mm) reference hole						
		Instruments				
Probe diameter	Insert code <sup>1</sup>	ATC-125 A/B	ATC-155/156 A/B	ATC-157 A/B	ATC-320/650 A/B ITC-320/650 A	ITC-155 A
3 mm	803	125260	125260	125290	125259	125290
4 mm	804	125262	125262	125291	125261	125291
5 mm	805	125264	125264	125292	125263	125292
6 mm	806	125266	125266	125293	125265	125293
7 mm	807	125268	125268	125294	125267	125294
8 mm	808	125270	125270	125295	125269	125295
9 mm	809	125272	125272	N/A	125271	N/A
10 mm	810	125274	125274	N/A	125273	N/A
11 mm	811	125278	125278	N/A	125277	N/A
12 mm	812	125280	125280	123299 <sup>2</sup>	125279	123299 <sup>2</sup>
13 mm	813	125282	125282	123300 <sup>2</sup>	125281	123300 <sup>2</sup>
14 mm	814	125284	125284	N/A	125283	N/A
15 mm	815	125286	125286	N/A	125285	N/A
Package of the above inserts	-	125389	125389	125387	125388	125387
Set of insulation plugs for 1/4 in. reference hole	-	126240	125511	125510	N/A	N/A



Spare part no. for predrilled inserts with 1/4 in (6.35 mm) reference hole						
		Instruments				
Probe diameter	Insert code <sup>1</sup>	ATC-125 A/B	ATC-155/156 A/B	ATC-157 A/B	ATC-320/650 A/B ITC-320/650 A	ITC-155 A
1/8 in	901	125297	125297	125314	125296	125314
3/16 in	902	125299	125299	125315	125298	125315
1/4 in	903	125301	125301	125316	125300	125316
5/16 in	904	125304	125304	125317	125303	125317
3/8 in	905	125306	125306	N/A	125305	N/A
7/16 in	906	125308	125308	123301 <sup>2</sup>	125307	123301 <sup>2</sup>
1/2 in	907	125310	125310	123302 <sup>2</sup>	125309	123302 <sup>2</sup>
9/16 in	908	125312	125312	N/A	125311	N/A
Package of the above inserts	-	125392	125392	125390	125391	125390
Set of insulation plugs for 1/4 in. reference hole	-	126240	125511	125510	N/A	N/A



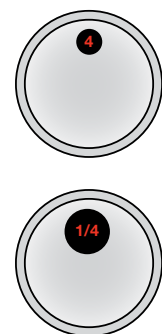
Note: All inserts (metric and inches) are supplied with a hole for the 4 mm OD reference sensor.

Note 1: Use the insert code, when ordered as the standard insert together with a new calibrator.

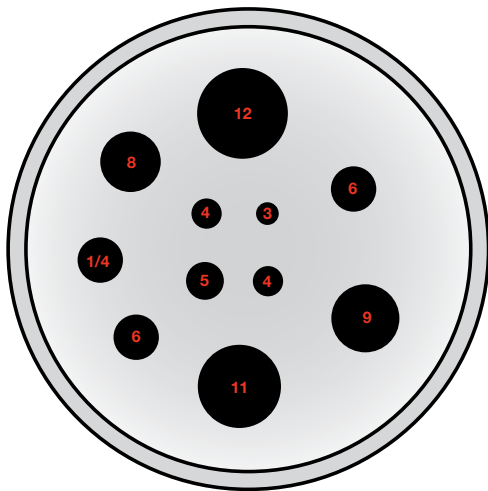
Note 2: ATC-157 / ITC-155: 12 mm, 13 mm, 7/16 in and 1/2 in inserts are delivered without the 4 mm reference hole, but supplied with a matching insulation plug.

**UNDRILLED INSERTS FOR ATC AND ITC SERIES**

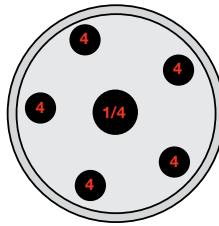
		Instruments					
Inserts		ATC-125 A/B	ATC-155/156 A/B	ATC-157 A/B / ITC-155 A	ATC-320/650 A/B / ITC-320/650 A	ATC-140 A/B	ATC-250 A/B
5-pack, undrilled inserts		122720	122720	123286	122719	N/A	N/A
5-pack, undrilled inserts with a 4 mm hole for the reference probe		122722	122722	123285	122721	N/A	N/A
5-pack, undrilled inserts with a 1/4 in hole for the reference probe		125288	125288	125313	125287	N/A	N/A
One undrilled insert		N/A	N/A	N/A	N/A	124899	124891
Undrilled insulation plug		126040	122781	123304	N/A	N/A	N/A



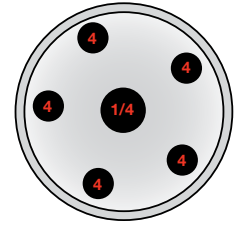
**MULTI-HOLE INSERTS FOR ATC AND ITC SERIES - METRIC (MM)**



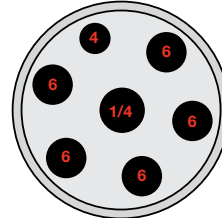
Multi-hole M01  
(ATC-140/250 A/B)



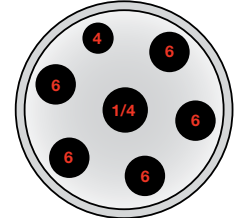
Multi-hole M01  
(ATC-125 A/B)



Multi-hole M01  
(ATC-156/320/650 A/B /  
ITC-320/650 A)



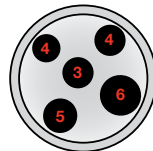
Multi-hole M02  
(ATC-125 A/B)



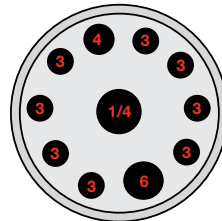
Multi-hole M02  
(ATC-156/320/650 A/B /  
ITC-320/650 A)



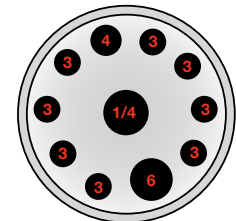
Multi-hole M01  
(ATC-157 A/B / ITC-155 A)



Multi-hole M02  
(ATC-157 A/B / ITC-155 A)



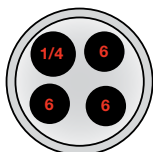
Multi-hole M03  
(ATC-125 A/B)



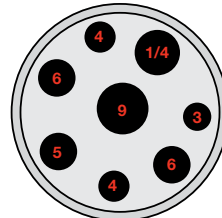
Multi-hole M03  
(ATC-156/320/650 A/B /  
ITC-320/650 A)



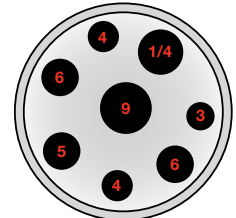
Multi-hole M03  
(ATC-157 A/B / ITC-155 A)



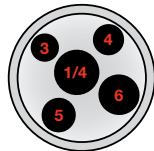
Multi-hole M06  
(ATC-157 A/B / ITC-155 A)



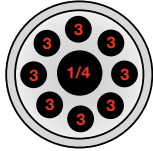
Multi-hole M04  
(ATC-125 A/B)



Multi-hole M04  
(ATC-156/320/650 A/B /  
ITC-320/650 A)



Multi-hole M07  
(ATC-157 A/B / ITC-155 A)



Multi-hole M08  
(ATC-157 A/B / ITC-155 A)

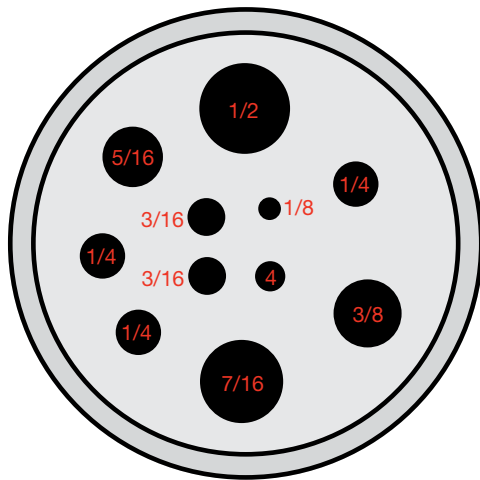
Spare part no. for multi-hole inserts - metric (mm)						
Insert code <sup>1</sup>	Instruments					
	ATC-125 A/B	ATC-155/156 A/B	ATC-157 A/B / ITC-155 A	ATC-320/650 A/B / ITC-320/650 A	ATC-140 A/B	ATC-250 A/B
M01	126272	122751	123294	122750	124897	124889
M02	126273	122753	123295	122752	N/A	N/A
M03	126274	122755	123296	122754	N/A	N/A
M04	126275	122757	N/A	122756	N/A	N/A
M06	N/A	N/A	125377	N/A	N/A	N/A
M07	N/A	N/A	125378	N/A	N/A	N/A
M08	N/A	N/A	125379	N/A	N/A	N/A

Note: All multi-hole inserts (metric and inches) for ATC-125/140/156/157 and ITC-155 are supplied with a matching insulation plug.

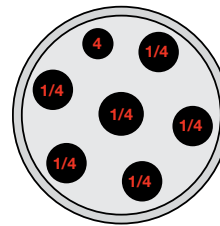
Note: Remember to use matching insulation plugs.

Note 1: Use the insert code, when ordered as the standard insert together with a new calibrator.

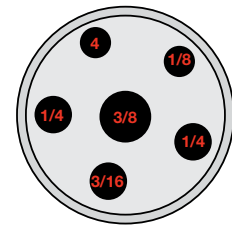
**MULTI-HOLE INSERTS FOR ATC AND ITC SERIES - IMPERIAL (INCH)**



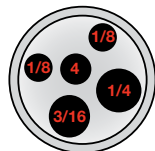
**Multi-hole M02**  
(ATC-140/250 A/B)



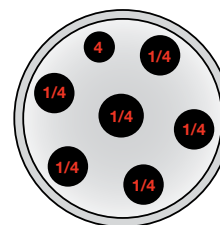
**Multi-hole M05**  
(ATC-125 A/B)



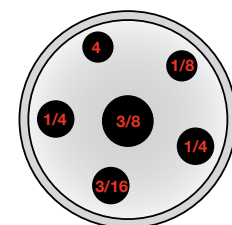
**Multi-hole M06**  
(ATC-125 A/B)



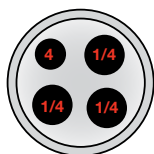
**Multi-hole M04**  
(ATC-157 A/B / ITC-155 A)



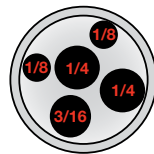
**Multi-hole M05**  
(ATC-156/320/650 A/B /  
ITC-320/650 A)



**Multi-hole M06**  
(ATC-156/320/650 A/B /  
ITC-320/650 A)



**Multi-hole M05**  
(ATC-157 A/B / ITC-155 A)



**Multi-hole M09**  
(ATC-157 A/B / ITC-155 A)

Spare part no. for multi-hole inserts - imperial (inch)						
Insert code <sup>1</sup>	Instruments					
	ATC-125 A/B	ATC-155/156 A/B	ATC-157 A/B / ITC-155 A	ATC-320/650 A/B ITC-320/650 A	ATC-140 A/B	ATC-250 A/B
M02	N/A	N/A	N/A	N/A	124898	124890
M04	N/A	N/A	123297	N/A	N/A	N/A
M05	126276	122759	123298	122758	N/A	N/A
M06	126277	122761	N/A	122760	N/A	N/A
M09	N/A	N/A	125380	N/A	N/A	N/A

Note: All multi-hole inserts (metric and inches) for ATC-125/140/156/157 and ITC-155 are supplied with a matching insulation plug.

Note: Remember to use matching insulation plugs.

Note 1: Use the insert code, when ordered as the standard insert together with a new calibrator.

## ORDERING CUSTOM-MADE SPECIAL INSERTS

Custom-made special inserts are made on request.

When ordering custom made special inserts a few details have to be noticed:

- Specify the instrument for which the inserts are ordered
- Specify the sensor size for each hole

Please contact us for custom-made inserts.

## APPLICATION KIT FOR CALIBRATION OF SANITARY SENSORS

At picture 1 you see a custom made insert and our STS-102 A cable reference sensor placed in a JOFRA ATC-156 B dry-block calibrator. At picture 2, the sanitary sensor has been fitted into the insert and is ready for calibration. Note that the design makes room for the reference sensor cable.



Picture 1



Picture 2



Application kit

### AMETEK Test & Calibration Instruments

A business unit of AMETEK Measurement & Calibration Technologies Division offering the following industry leading brands for test and calibration instrumentation.

#### JOFRA Calibration Instruments

##### Temperature Calibrators

Portable dry-block calibrators, precision thermometers and liquid baths. Temperature ranges from -90°C (-130°F) to 1205°C (2200°F). Temperature sensors for industrial and marine use.

##### Pressure Calibrators

Convenient electronic systems ranging from -25 mbar to 1000 bar - fully temperature-compensated for problem-free and accurate field use.

##### Signal Instruments

Process signal measurement and simulation for easy control loop calibration and measurement tasks.

#### M&G Pressure Testers & Pumps

Pneumatic floating-ball or hydraulic piston dead weight testers with accuracies to 0.015% of reading. Pressure generators delivering up to 1,000 bar.

#### Lloyd Instruments

Materials testing machines and software from Lloyd Instruments guarantees expert materials testing solutions. The comprehensive program also covers Texture Analysers to perform rapid, general food testing and detailed texture analysis on a diverse range of foods and cosmetics.

#### Davenport Polymer Test Equipment

Allows measurement and characterization of moisture-sensitive PET polymers and polymer density.

#### Chatillon Force Measurement

The hand held force gauges and motorized testers have earned their reputation for quality, reliability and accuracy and they represent the de facto standard for force measurement.

#### Newage Testing Instruments

Hardness testers, durometers, optical systems and software for data acquisition and analysis.

**AMETEK®**  
TEST & CALIBRATION INSTRUMENTS

**UK**  
AMETEK Calibration Instruments  
Tel +44 (0)1243 833 302  
jofra@ametek.co.uk

**France**  
AMETEK S.A.S.  
Tel +33 (0)1 30 68 89 40  
general.lloyd-instruments@ametek.fr

**Germany**  
AMETEK GmbH  
Tel +49 (0)2159 9136 510  
info.mct-de@ametek.de

**Denmark**  
AMETEK Denmark  
Tel +45 4816 8000  
jofra@ametek.com

**USA**  
AMETEK Mansfield & Green  
Tel +1 (800) 527 9999  
cal.info@ametek.com

**India**  
AMETEK Instruments India Pvt Ltd.  
Tel +91 22 2836 4750  
jofra@ametek.com

**Singapore**  
AMETEK Singapore Pte Ltd  
Tel +65 6484 2388  
jofra@ametek.com

**China**  
AMETEK Inc. - Shanghai  
Tel +86 21 5868 5111  
AMETEK Inc. - Beijing  
Tel +86 10 8526 2111

AMETEK Inc. - Guangzhou  
Tel +86 20 8363 4768  
jofra.sales@ametek.com.cn

[www.jofra.com](http://www.jofra.com)

Information in this document is subject to change without notice. ©2012, by AMETEK, Inc., www.ametek.com. All rights reserved.